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HEALTH DEPARTMENTS AND HOUSING.

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Read before the National Housing Conference, December, 1912, Philadelphia, Pa.

The most common reason for neglect, by officials or citizens in any community, of housing reform measures, is their lack of apprehension that bad housing exists in that community. No health officer is well advised in 1912 who does not know that it has now been demonstrated that every city or town of sufficient size to have organized health control is already infected, to a greater or less degree, with the deadly virus of the slum. Whether his community be an industrial city, a traffic center, a college town, or a river village, he has only to look for housing evils to find them. The duty of every health officer to discover the bad housing in his city or town is an obligation which cannot be dissociated from other official responsibilities.

Bad Housing (Lovejoy) consists in "Houses that are

(a) Poorly lighted,
(b) Unventilated,
(c) Damp,
(d) Imperfectly drained,
(e) Exposed to undue fire peril,
(f) In bad repair,
(g) Vermin infested,
(h) Disease infected,
(i) With uncleanly surroundings,
(j) With insufficient water supply,

(k) Without toilet accommodations adequate for comfort, cleanliness and privacy,
(l) With defective plumbing,
(m) With overcrowded rooms, and
(n) With cellar tenements."

Such Houses are

"Dangerous to moral and physical health, social and personal, and Promote

(a) Industrial inefficiency,
(b) Inebriety,
(c) Dependence,
(d) Poverty,
(e) Disease,
(f) Death,
(g) Juvenile delinquency,
(h) Debased citizenship,
(i) Vice and crime,
(j) Degeneracy of race."

The *prevention* and *cure* of bad housing conditions must proceed along three lines:

I. Every *new* dwelling and tenement *must* be constructed as to *afford suitable living accommodations;*

II. Every *old* house *not* now *fit for habitation must* either *be demolished or improved* so as to become fit;

III. *All habitations*, *new* and *old*, must be *maintained in good repair* and *sanitary condition*.

It is our purpose to inquire with what weapons health authorities, especially municipal health officers, may engage in active warfare against the brood of housing evils, and what places in the line of battle they should take.

1. STANDARDS FOR NEW HOUSES.

The important standards required for new houses depend upon the application of physical laws and established principles of hygiene. Some of these laws and principles are based upon the common knowledge of intelligent persons and others depend upon the experimental confirmation of hypotheses.

The prescribed sizes of rooms are based upon observations of the extent to which the contained air becomes vitiated by the presence of a number of persons in a room during a given time and the opportunities for change of air in the room through leakage of its walls and ceilings or through window or door openings.

The standards for window design are reasonably determinate and depend both upon the natural laws which govern the transmission and absorption of light and our observation of the actual illumination produced under various circumstances.

At the present time most of the standards prescribed by housing law are to a degree empirical and practical rather than scientific. They are, however, continually in process of modification and strengthening by each day's observation of their application and actual use in buildings.

The time has come when the provisions now in effect governing the size, lighting, and ventilation of habitable rooms in tenements should be applied also to living rooms in other classes of dwellings. This has not been done, so far as I am aware, except in the Chicago Building Code of 1911, in which section 274 sets the same standards for living rooms in all classes of buildings.

The health officer, while not posing as a court of last resort in certain of these matters, should be qualified by his training and experience to demonstrate the advantages which result from the use of such standards, and should, moreover, be willing to participate cordially in the framing of laws in which these standards are embodied.

He may be sure that no effort in housing advance will result in such lasting reward as the successful expression of health standards in the structure of new habitations.

2. THE IMPROVEMENT OF UNFIT DWELLINGS.

The improvement of a house unfit for habitation mainly consists in structural changes in the framework of the building and in its plumbing and drainage equipment.

In extreme cases of deterioration it becomes necessary to reconstruct floors and roof and sometimes parts of the outer walls. Such vital repairs and replacements ought to be prevented by the requirement of law that no dwelling which has become damaged by fire or otherwise to the extent of half its value or more should be reconstructed.

In most cases, however, the actual replacement of defective portions of the structure is limited to new joists and floor in the lowest story and piece-meal repairs elsewhere, including some rearrangement of partitions and replacement of old plumbing. In no city outside of New York, in cases of repair involving 20 per cent. or more of the cost of a house, should living rooms be allowed unless each such room has a minimum floor area of 70 square feet and is provided with a good window opening to a suitable open space.

With respect to plumbing, it may be said in a general way that soil and waste pipes more than twenty-five years old will not be found free from grave defects in design and jointing. Most plumbing fixtures over fifteen years old, especially water closets, will be unfit for further service. The drainage system of an old building, unless its integrity can be proven, should be replaced.

The changes described are expensive and will often be resisted by the owner as unnecessary and unjustified, especially if the tenants are of the unthrifty sort who make a bad house worse by neglect and abuse. To enforce laws under these circumstances of opposition the converging efforts of building, legal and health authorities are required to make a clear demonstration to the owner and sometimes to judge and jury that community degradation results from bad housing.

3. The Demolition of Unfit Dwellings.

Slovenly shacks and ramshackle shanties, tumble-down sheds and tottering stables, dwellings in disreputable disrepair, "shame-stained and bearing the nauseous odors of decay," disfigure our cities to an unnecessary extent.

The health authorities who realize the nuisances and social dangers that result from the existence of such structures may and must take the initiative in community movement for their destruction.

The Board of Survey in Chicago is composed of one Medical Inspector, one Sanitary Inspector and one Building Inspector, and has, during the past four years, accomplished only meagre results. There were 94 buildings demolished in this period and 43 repaired. The principal reason for such small accomplishments is the fact that the Board is composed of men who are busy in their respective departmental duties and is not provided with any assistant who can devote his time continuously to the examination and condemnation of buildings.

For some years past the Board of Health of Boston, through Chief Inspector Jordan, has devoted attention to the demolition of entirely unfit houses and of such lean-to and rear extensions of houses as have been found doubly undesirable from both health and structural viewpoints. The total number thus razed during the past eleven years, varying with the meagre appropriations available for this use, is 1,138, or an average of 103 per year.

A third example of such activities is the remarkable work done since 1907 in Washington, D. C., by the Board for the Condemnation of Unsanitary Dwellings, resulting in the tearing down of 1,503 houses unfit for habitation and the thorough repairing of nearly as many more. This unprecedented result has been achieved through the active coöperation of Doctor Woodward, health officer, with his colleagues on the Board, and is in part due also to the steady employment on this work of Inspector Haynes, whose energy and tact has stimulated the work of the Board and the courts.

The clean-up of our cities and towns by the tearing down of unsightly and unfit houses will in general depend upon the appointment of some discriminating employee whose sole business it shall be to look up such cases, determine the extent of deterioration and issue authoritative notices requiring prompt repair or demolition. He must have power, if such notices are not complied with, to raze the buildings without protracted process of law.

4. The Relation of the Health Officer to the Maintenance of Houses.

While the coöperation of the health officer is required in the design and building of new houses and the reconstruction of existing ones, the keeping of both new and old, within and without, in fit condition for habitation, is particularly his province. His ceaseless function is the exercise of practical sanitation and instruction in its tenets to owner, agent and tenant.

This means patient, tactful, tireless enforcement of the laws which prohibit overcrowding, unclean accumulations, the presence of horses, pigs and goats, the occupation of unfit cellars and attics, etc., as well as the affirmative provisions that the house, its surroundings and all its parts, especially its plumbing and drainage, shall be kept clean and in good repair.

The means for accomplishing these results consist in

(a) An adequate inspection service acting upon its own initiative as well as upon complaints.
(b) A sufficient office force.
(c) An individual record system for each home.

These tools of administration must be supported by prompt courts and active prosecutors, upheld in turn by a sympathetic public opinion.

A Trained Inspection Force.

The best method of selection (Civil Service examinations) will give only untrained inspectors, some of whom will have been clerks, some carpenters, some plumbers, etc. This raw material must be made into a homogeneous force of inspectors by a systematic school of training which will relate to

(a) The purpose and history of housing reform,
(b) Their attitude toward the public and toward other officials,
(c) The general duties they have to perform,
(d) The laws they are to enforce,
(e) The methods of making records.

A properly graded force will consist of chief inspector, deputy chief, supervising, verification, special and district inspectors, including some women inspectors.

THE OFFICE FORCE.

The office force should consist of a chief clerk, correspondence, reviewing, complaint, file and personnel clerks, stenographers and typists.

RECORDS.

Card reports written in the field on prepared blank forms are now recognized as the most advantageous kind of inspector's records. These should be specially designed for certain lines of investigation, as for new tenements, basements, overcrowding, plumbing, etc.

With respect to organized methods of housing inspection and control it may be said that the highly organized tenement house department of New York City exemplifies interesting details not yet applied in other departments.

5. PERIODICAL HOUSE TO HOUSE INSPECTION.

There is no city of 100,000 or more population, and probably none of 50,000 which does not contain a few blocks at least where the housing conditions will never be cured by occasional piece-meal applications of any remedy. As already intimated, it will not do to treat these areas by the time-honored but antiquated method of inspection on complaint.

Mr. Veiller has well said: "In place of this casual, haphazard method there must be substituted the only system of sanitary inspection that is worthy of the name. Instead of sitting calmly waiting for complaints, health inspectors must systematically go about 'looking for trouble'—they will find plenty. Instead of sending a man to look at one thing in one house, because it is complained about, there should be a well-trained corps of men going over every part of the homes of the poor, systematically and thoroughly, scrutinizing carefully every part of the building where trouble might naturally be expected—all the probable danger points."

In Chicago it is estimated that there are more than 1,000 city blocks which should be thus "combed" at least twice or thrice annually. In 1909 we were able to canvass once over only 100 blocks; in 1910, 120. Alas, our hitherto proud accomplishments, standing next to New York and Boston in this regard, have now lapsed into innocuous desuetude, for in 1911 we were able only to canvass 25 blocks, and in 1912, only 17.

6. THE PREVENTION OF OVERCROWDING.

The question of room overcrowding is to be given full consideration at a later session, but it is worth while to note here that no effective measures of detection and prevention of this insidious evil are in force except in two or three cities to a slight extent.

A noteworthy example in this regard is the work done by the medical health officer of Liverpool, Eng., with respect to overcrowding in sublet houses. Tabulated statements for ten years past show that the number of such houses registered has fallen from 22,488 in 1904 to 18,800 in 1911. The night visits for the detection of overcrowding, not less than 17,000 in any year of the past ten, reached its maximum of 23,534 in 1909. The number of convictions for overcrowding, 1,351 in 1901, decreased to 414 in 1910. Such activity as this our American cities can well emulate.

This menace to both health and morals will not, it seems to me, be checked until we are able to overcome our prejudice to the entrance of inspectors at night and are willing to surrender something of the freedom of the home. Authority of law must be had for posting on the walls and entrances of suspected rooms a permanent placard stating the maximum number of persons who may lawfully occupy the room in question and the penalty which is to be incurred for crowding above the specified limit. Such a notice would be observed and violations noted by police and health inspectors, nurses, etc., but would also be advice to the owner, lessee, tenant, and, no doubt, as well, to parish priest, probation and truant officers, settlement residents, and to any person likely to care to check this evil.

I know that a law authorizing such posting of rooms would have little hope of passage in Chicago at present because of the lack of apprehension of the evil to be cured and the cry that it would violate the sanctity of the home of the poor man.

7. The Control of Contagious Diseases in the Tenement.

If every other reason was lacking to stimulate the interest of health authorities in housing reform, increased incidence of contagious diseases, due to close contact of the members of a family in low, small, crowded, ill-ventilated and dirty rooms would be a sufficient argument for their attention.

Speaking of this, Commissioner Young says: "We exclude from school all cases of contagious diseases when we discover them. What do we do when we exclude them? In about 86 per cent. of the diphtheria cases the cry comes back, 'We have no place to stay at home. There are two or three or four children and we live in two rooms, or two rooms and a kitchen. What shall we do with the other children?'" In the City of London in 1911, 85 per cent. of diphtheria cases were cared for in hospitals; in Chicago $15\frac{1}{2}$ per cent.; of scarlet fever patients, 90 per cent. in London; 7 per cent. in Chicago. For all active contagious diseases London has provided about 6,400 beds, New York about 1,800, and Chicago about 425.

Mr. Health Officer, is it not true that isolation, cleanliness and uncontaminated food are impossible for the members of a family living in a congested tenement home? Is it not hopeless to expect hospital facilities sufficient to provide for the removal of every child, sick with diphtheria or scarlet fever, from its home to a hospital bed?

Add to these considerations the exposure to infection which occurs so frequently from the common use of toilet facilities by the sick and well, and often by members of two or three different households, and the wonder grows, not that many are made sick, but that any escape the inroads of contagion.

8. The Abolition of the Privy Vault and Outside Toilet.

If health departments do not cry aloud against the privy vault, this ancient evil, not alone of the congested city but of sparsely settled neighborhoods, little protest will be heard from other officials or residents. All sanitarians, however they may differ as to their methods of disease control, agree that hygiene, decency and convenience alike demand the abolition of the privy vault and its next of kin, the outdoor water closet. If vaults must exist because of lack of sewerage facilities, health officials are in duty bound to prescribe and control methods of construction and maintenance such as are least likely to injure the health of the community.

Where necessary to be provided, privy accommodations may be either of three kinds of construction:

(a) Small and shallow metal pans or pails set on an impermeable platform above the level of the ground;

(b) A tight barrel buried not more than three-fourths of its height in the ground; or

(c) A tight masonry vault projecting at least 8 inches above the ground surface.

Whatever the receptacle, it must be surmounted by a fly-proof, ventilated shelter house.

To do away with all vaults at the earliest date the health officer must early and late urge the need of extension of the sewer system into all unsewered territory, and when sewers are available he must see that plumbing is provided and the old-time depository forever banished.

9. The Collection of Household Statistics.

The problems of housing are to be solved as all other important questions of social welfare are to be answered by scientific inquiry as to the facts involved.

The collection and arrangement of the statistics which prove that a bad house is a menace to those who dwell therein is a service to housing reform which must be rendered, if performed at all, by health departments.

Just enough data has been collected to show the value of housing studies, but with respect to many of the effects of bad housing we can only say "we do not know." We lack clear, scientific, affirmative proof.

Let us determine the relative mortality of infants born in tenement rooms and those born in good rooms. Let us show the deviation from normal standards of the little children in overcrowded homes. Let us compare the relative size, weight and strength of children who reach the legal age of employment from families belonging in crowded blocks with others in uncongested neighborhoods. Let us tabulate the prevalence of filth diseases in tenements and in single dwellings. Let us count the deaths in hovels and compare them with the deaths in decent homes. If we would learn the possibilities of health in normal housing conditions and of long life for all men we must collect such facts as these. When such comparisons can be accurately presented it will not take long to do away with the ancient and modern evils of the slum.

10. Health Publications and Housing.

The most effective factor in the program for good housing will be an informed, alert and exacting public opinion; hence, the most important of all considerations is the matter of education.

Reports or bulletins are now published by about 35 State Boards of Health and 70 city health officers. These vary greatly in educative value. Some consist in statistical tables only; some contain valuable results of scientific investigations; some, however (and the number is increasing), follow the lead of Dr. Frank W. Reilly, who, as Assistant Commissioner of Health of Chicago in 1894, began the publication of health information in popular form.

Up to the present, references to housing in regular reports and bulletins are meagre and rare. So far as I am aware none of the special bulletins devoted to a single subject, as tuberculosis, small-pox, typhoid fever, pellagra, etc., has treated of housing. Surely the importance of housing reform and the material now obtainable will justify its consideration as a subject for publications of this kind.

11. Limitations of Health Activities Caused by Weak Laws and Small Appropriations.

As I look over this audience, I recognize the faces of men who stand in the front rank as health administrators, and whose devotion to the cause of housing reform is evidenced both by their presence here and the services they have rendered. These men will say that some things that I have set forth as desirable are now impossible because of two limitations of their efforts:

1st: The lack of power to enforce laws;

2nd: The limited appropriations made for health purposes.

It is lamentable to discover how little real authority to enforce laws has been given by legislatures and city councils to health officers. Sometimes it almost seems that the purpose of the law is to protect the one who is maintaining a nuisance against the rightful demand of all the other people that the nuisance be abated. The power of summary abatement is quite lacking in most of our cities.

Most health laws are framed on the theory that no steps can be taken to anticipate and head off disease, but that action can only be taken to cure existing evils after they have become fully developed. This is all true, but the action of progressive health authorities will be hampered less and less by antiquated laws, and the speed of advance will depend upon the urgency with which they press the necessity of changes upon reluctant lawmakers and prosecutors.

The increase of health appropriations from twenty or thirty cents per capita to one dollar will come only after public opinion is aroused to a due appreciation of the economy which will result from preventive health measures. Health officers can forward this movement to some degree, but this advance will mainly depend upon other classes of workers represented in this conference.

12. Conclusion.

I picture in my mind's eye a city in which the babe, yet unborn, will feel in its being the stimulus of sunshine and fresh air; in which the infant will be born into a house fit to receive a gift of heaven; in which the child will never know the burden of the slum, but through normal development will come to manhood ready joyfully to do his share in the work of the world and qualified to assume a worthy citizenship.

Having such a forecast in mind let us not be satisfied until we have made it take substance.

ROOM OVERCROWDING AND THE LODGER EVIL.

LAWRENCE VEILLER,
Secretary and Director, National Housing Association, New York.

Read before the National Housing Conference, December, 1912, Philadelphia, Pa.

It is rather humiliating after seventy years of effort at housing reform in America to confess, as we have to confess, that one of the most serious housing evils encountered in any country has not been grappled with and that practically no plan for its solution has as yet even been proposed.

Embarrassing as such an admission is, we must, however, in all fairness, frankly confess that, so far as the great problem of room overcrowding goes, there has been no serious attempt made in America to cope with it nor any rational plan for its solution heretofore presented.

Moreover, we are seemingly without accurate information as to the extent of the evil. There exist only vague impressions, based upon individual cases which have come to the attention of imaginative journalists or sympathetic social workers, although it is to be hoped that some light will be thrown on this subject by the investigation made by the Congressional Committee on Immigration some two years ago, the results of whose work are now in process of publication in some forty-six volumes.

Just how great an evil *is* room overcrowding in America? Is it merely a New York condition, or do we find it manifesting itself in other American cities, and has it become a serious evil in those cities? Further, is it an evil found only in cities? May we not find it even in small towns and villages, and possibly even on the open prairie?

The most picturesque accounts that we have thus far heard are of two episodes that have become very familiar. They give promise of being repeated with as much persistency as the old familiar fable of the coal in the bathtub.

One is that highly flavored incident of the newspaper reporter finding four families keeping house in one room with chalk lines dividing off the floor into four parts, only the width of the chalk line separating family from family.

The other is the less frequently repeated story, but one with probably a far greater basis of fact, of the "Box and Cox" arrangement, by which rooms in many houses are occupied by double shifts of workmen, one group sleeping in the rooms and beds by day, the other by night. More valid testimony than such sensational instances afford, is obtained from social workers, especially from those living in settlements; from them we learn of numerous individual instances of small apartments occupied by a large number of people. The instances thus reported are generally, however, isolated ones, chanced upon in the course of neighborhood visits. Whatever the scientific accuracies or inaccuracies of the testimony at hand, the range is certainly wide. One case of thirteen people in one room in a small shanty on the prairies of Indiana would seem to mark the extreme limit of the manifestations of this evil.

With regard to one fact, all observers are agreed: That the evil of room overcrowding is manifested chiefly among certain elements of our alien population; the Italians, the Poles, and Russians, and the later immigration of Slavonic races. We do not hear of many accounts of it being encountered with the Irish, the negro or our own poor whites, although individual cases among all these races have come to our attention.

We are similarly without accurate facts as to the causes of this evil. One group in the community tell us that it is due entirely to economic conditions; that it is a direct result of poverty; that it is caused by the high rents which the poor have to pay and that they are forced by need to take in lodgers to eke out their scanty income. On the other hand, many observers are of the opinion that in the majority of cases it is not so much need as greed; that it is not due to dire necessity so much as it is to the desire of certain elements of our alien population to add penny to penny, dollar to dollar, with the greatest rapidity, and who care little how they live in their feverish race for money. We are also told that, instead of these conditions being the result of high rents, they are the cause; that the landlord, finding that his tenants are making their rooms a source of income by letting out a portion of them and taking in lodgers, makes up his mind that the rooms will bear an increased rental and accordingly raises the rent; this, in turn, causes the tenant to take in more lodgers to meet this increased rental, and later, the landlord, finding that the rooms are affording a still further increased revenue, proceeds again to raise the rent, and so on, to what might be termed the limit of elasticity, beyond which the tenant's purse cannot be stretched.

The writer believes that there is truth in both of these views; that in many cases room overcrowding is undoubtedly due to need; that the low earning capacity of the family, the uncertainty of employment, the sickness of the wage-earner, in a word, a variety of social and economic causes, do make it necessary for many of our poor people to eke out a scanty income by this means. It is the easiest and surest method at command for increasing the family income.

On the other hand, so far as the writer can judge from his twenty years' observation of life among the poor, this evil is caused far more by greed than by need; by the desire to rapidly acquire money than by the necessity for increasing the income.

I attribute it also to a third cause, namely, racial solidarity. This is a factor in the situation which heretofore has not been sufficiently considered.

Room overcrowding as we know it in America is almost entirely wrapped up with the lodger evil. It is seldom due to the large size of the family, contrary to the popular impression; the cases of overcrowding due to the large family are so seldom met with as to be negligible. Were there no other manifestations of room overcrowding than the few cases of large families in small quarters that are encountered, housing reformers might well give no further consideration to the problem.

The real evil lies in the practice of taking outsiders into the family life, either as lodgers or boarders; generally single men of their own race, frequently from their own village, men who have come to this country, as many of our foreigners come, only to better their industrial condition and who, while they are here, intend to save every penny that can possibly be saved, denying themselves every comfort in order that they may return in a few years to their native land with a small competence with which they may be able to set themselves up as "landed proprietors."

The taking in of lodgers is frequently an act of help and aid to a fellow-countryman. The better established workingman thinks back to the time (not many years ago) when he was in a similar position, a stranger in a strange land, ignorant of the language of the country and unfamiliar with the industrial opportunities before him; a prey to every unscrupulous person who would profit by these handicaps. It is not strange, therefore, that he should be anxious to aid the friend, or the cousin of a friend from his own village, who, starting like himself, a young man, has come to this land of promise to make his fortune.

But it is not all friendship. The mutual advantage makes its appeal. The ordinary tenement dweller sees in the opportunity of taking in a lodger an increased income; a relief in meeting the tremendous burden of rent, the one fixed charge that cannot be evaded, which must be met at a regular date. Even a dollar a month looms large. The benefit is immediate and concrete; the ultimate cost is remote and unconsidered. Of course, we should frankly recognize that no matter how sympathetic the ordinary workingman is, he is not going to take a fellow-countryman into his family and keep him for nothing for any considerable period of time. It is, therefore, a commercial proposition with him, as well as a sentimental one.

I am led more and more to the conclusion that it is primarily this element of racial solidarity, coupled with the obvious financial advantage and augmented by the lack of proper housing accommodations for the newly arrived single immigrant that we must regard as the basic factor in our problem of room overcrowding.

So much for the causes; now, as to the effects of this evil. Here, too, we are singularly without accurate information. We have been told for years that the practice of taking outsiders into the family life is fraught with serious evils to the community; evils of a physical, moral, civic, social, industrial and economic nature. That this is so, I, for one, have no doubt. We should, however, be better equipped for the attack if we had a more certain basis of accurate data at our command. All that we can rely upon, however, is the appeal to reason. From the very nature of things the results of room overcrowding must be of this kind and the ordinary person at once grants this without the necessity of arraying a series of incontrovertible facts to prove our case.

There are, of course, in the experience of the social workers of the country innumerable individual instances where the moral effects of room overcrowding are strikingly illustrated, where the introduction of strange men into the family life has led to the breaking up of homes, to the separation of husband and wife, to the going astray of young daughters just emerging into womanhood.

So far as the physical effects of room overcrowding are concerned, we have at hand considerable information, the results of studies made in Great Britain and other countries, showing the increased deathrate, the lesser height and weight, and the less developed physical condition of children reared in one room than of those reared in two rooms, and similarly the less advantageous condition of those reared in two rooms than those reared in three rooms, and so on. I, for one, feel hesitation in basing arguments on these conclusions. To me it simply means that the investigators have found what any intelligent person could have told them in advance they would find. It does not require scientific investigation nor special wisdom to realize that a higher deathrate, greater industrial inefficiency and inferior physical condition will be found among the poorest elements of the community, who, because of their poverty, can only afford one room to live in and that often the poorest kind of accommodation to be found in the city; that their children should compare unfavorably with the children of families whose economic position enables them to live in more commodious quarters is not a matter of surprise.

May it not be that they live in one room because they are poor and weak, not that they are poor and weak because they live in one room?

With regard to the civic effects of room overcrowding, we are on sure ground. The social worker is in a position to observe every day in the year the bad results from this kind of living; the serious effect it has upon good citizenship; how difficult it becomes for the person living under these conditions to have an interest in the welfare of the city.

The bad social effects of this method of living are only too easily observed. It can hardly be called living; it is merely existence and nothing more. In the words of Doctor Russell of Glasgow:

"I ask you to imagine yourself with all your appetites and passions, your bodily necessities and functions, your feelings of modesty, your sense of propriety, your births, your sicknesses, your deaths, your children,—in short, your lives in the whole round of their relationships with the seen and unseen, suddenly shriveled and shrunk into such conditions of space. I might ask you, I do ask you, to consider and honestly confess what would be the result to you."

Irrespective of what facts can be measured, there can be no doubt that the evil of room overcrowding, due as we have seen largely to the practice of taking outsiders into the family life, is one that is fraught with serious consequences to the welfare of the community as well as to the individual. Where this evil is entrenched, it must be fought resolutely; where it has just begun to show itself, it should be nipped in the bud. No sentimental plea of the rights of the individual should be tolerated. Let us not be led astray by the argument that the workingman's home is his castle, that its privacy cannot be invaded by officials for inspectorial purposes any more than the rich man's.

We admitted long ago the right of the community to inspect and control both rich and poor in cases of contagious disease, and it is a slavish devotion to dogma that does not recognize the right of governmental interference where the peril is both moral and physical. Nor should we be influenced either by the plea of poverty and necessity that the workingman is forced to these conditions and that, therefore, the evil must be tolerated.

Just as surely as it is tolerated, we must face the breaking down of American standards of living, of morality, of civic and social responsibility, of even liberty itself.

Like many other social problems, it is mush easier to state the conditions as observed than to formulate effective methods for remedying them.

Out of our seventy years' experience in America, it might be supposed that we should find some experience in coping with this evil which would aid us. The only two cities that I know of where any serious effort has been made to meet the situation, are New York and Boston, and while neither of these communities can be considered in the slightest degree as having solved this problem, yet, there is that in their experience which is of value to us; we may learn more from mistakes sometimes than from successes.

About fifteen years ago, New York City did make a more or less serious effort to cope with the problem. In those days the enforcement of the tenement laws was vested in the Health Department which had its offices in the heart of the lower Italian Colony, down in Mulberry Street, a few blocks from the notorious Mulberry Bend, made famous by that valiant apostle of tenement house reform, Jacob A. Riis.

The method employed at that time was as follows: Policemen in squads of two were sent out to make night inspections in those tenements in which the Board of Health expected that room overcrowding would prevail. This was chiefly in the Italian and Russian Polish colonies. Each night the officers started on their work about eleven o'clock and worked until three in the morning. Entering a tenement house they would quietly ascend the stairs and knock at the door of an individual apartment. After a long delay, some sleepy voice would call out in Italian "What was wanted?" to which the answer would be "To open the door that they were the police." After a long delay the door would be opened and admittance gained; all that generally would be discovered would be a very sleepy Italian family in various stages of undress, holding a lighted candle or lamp, and grumbling at being disturbed in their slumbers. The officers would then carefully search through the rooms, and as a rule would find no one there but the members of the family. They would then descend to another apartment, and the same process would be repeated throughout the house.

To the observer who happened to be passing through the street at that time, an interesting spectacle was presented. His curiosity, I am sure, must have been very much piqued; he must have wondered what that stream of men was going up and down on the outside fire-escapes; for the "simple Italian peasant" in his childlike innocence had seen to it that all lodgers and boarders went out by the windows and down the fire-escapes on the front of the building, while the officers of the law were making their inspections, not to return until they had departed, when the colony of lodgers returned to their slumbers. So fine an art did this become in later years that the lodgers learned "to do the trick" without getting off the fire-escapes at all.

It is obvious that this method of enforcement was not a success. While it made the Board of Health appear diligent in good works, and while it did keep the persons who were guilty of the practice of taking in lodgers on the alert and made them realize that this practice was against the law, so far as the lodger evil itself was concerned, it had little practical effect.

For other reasons, this method was unsatisfactory. In the few cases where evidence of overcrowding was obtained, the case would be taken into a police court the following morning, and the tenant, generally a foreigner, haled before the judge. Why they always should have been "widows" I have never been able to find out, but widows they were; with her would come all of her own children, and—some borrowed from the neighbors for the occasion. She would shed copious tears, and between sobs would explain to the judge that all of the men found in her rooms were "cousins" or friends of the family who were just there for a night or two while they were looking for work. Under these circumstances, it is not surprising that the ordinary police magistrate was not inclined to send the tenant to jail even for a few days for an offense of this kind. And what usually happened in the old days when New York's police bench was run as part of the political machine of the city, was that the case ended in the magistrate reading the policeman a lecture for harassing a poor woman who had so much difficulty in earning her living.

With the coming into existence of the Tenement House Department ten years ago, and the transfer of the enforcement of the law to that department, the practice of night inspection was abandoned, not because the evil of room overcrowding had ceased, but because it had been shown conclusively that the methods used had not proved successful.

The only other city where any serious effort has been made to cope with room overcrowding is Boston. Under the laws in force in that city the only power which the Health officers have when they discover evils of this kind is to order the premises vacated; that is, have the lodgers removed. They are utterly unable to bring about the punishment of the persons responsible for the evil. In response to a recent inquiry, the Health Department of that city says: "Where we have been able to prosecute under the public lodging house law, these people have been turned out of business, but where vacation is the only remedy, we have found that it is absolutely ineffective, as we have been driving the same people from place to place for the last twenty years, and there is no doubt that they will continue in the business as long as there is a profit in it. In the cases which were prosecuted, where the fine of fifty dollars was imposed, every one of the offenders convicted quit the business."

It is thus seen from the experience of these two cities, which may be taken as fairly illustrative of others, that not only have the methods heretofore employed been ineffective, but that there are inherent difficulties in the situation to be overcome. Not only are the existing laws inadequate, but the attitude of our minor courts and of the public generally must be changed before we can expect satisfactory results.

How inadequate our laws are is soon seen. The only requirement to be found in most states is the one that there shall not be less than a certain amount of cubic air space for each occupant of the room. Speaking generally, this has been, with one or two slight exceptions, the only form of legislation that has been attempted. So accepted has this idea of cubic air space become in the popular mind as the measure of good or bad conditions, that it is only recently that we have been able to impress upon health officials and housing workers the fact that many other considerations are involved than this one of the amount of air that is available in a given space. Far more important than the mere amount of air space is the kind and quality of the air, the frequency of its renewal, the possibility of its movement within the room, the kind of room that is occupied—whether it is well-lighted and whether sanitary conditions are observed. As the writer has had occasion to point out frequently, a very small room opening directly on the street, with a large window, well lighted and ventilated, and with cross ventilation, even though small in size, is far better as the sleeping quarters of two adults than a much larger room affording twice as much cubic air space per occupant, badly ventilated and securing its ventilation from a small enclosed air shaft.

Has not the time at last come when the housing workers and health officials of the country should embark upon a campaign of education of the public, on the fallacy of cubic air space as a measure of proper conditions? We need to wage an active campaign against high temperature and air that is not moved, rather than on lack of cubic air space.

The only other provision to be found in our housing laws dealing with this subject, is the requirement, found in the laws of a few cities, that no part of a tenement house shall be used as a "lodging house" which is generally defined as a place in which persons are harbored or received or lodged for hire for a single night or for a week or less. Were this provision to be invoked in an attempt to prohibit the taking in of lodgers, I have no doubt that it would prove quite valid, but I know of no city that has up to the present time made use of it.

It may well be asked by the thoughtful observer, "If America has so singularly failed to cope with this evil in her seventy years' effort to regulate housing conditions, what has been the experience of Europe?" Can we not find there some way out of our difficulty? Many social workers I know, feel that in the experience of Great Britain at least, the solution is to be found. In the Scotch cities of Glasgow and Edinburgh, there exists what is known as the "ticketed house" system, a scheme by which the sanitary officers measure a suite of rooms, calculate how many people may be permitted to live in it upon the basis of cubic air space, and with due regard to its sanitary conditions and the adequacy of its light and ventilation, and then affix to the door of the apartment a ticket or placard stating that the rooms may not be occupied by not more than so many people. Then, subsequently, night inspections are made, and if it be found that the rooms are occupied by a larger number of people than called for on the ticket, prosecution of the tenant is had.

We have been often urged to adopt this system in America. It happens that the city of Washington has had a law of this kind for some twenty years past. Upon inquiry, I learn that it has never been used in the dwelling houses or tenements of that city, but only in connection with the common lodging house. We therefore have little to guide us in the practical experience of any American city as to the value of this method as applied to American conditions, but in the fact that the responsibility for complying with its provisions rests on the tenant, it offers little hope as of value for American conditions.

My own belief is that our failure to remedy conditions heretofore has been due largely to the fact that we have not recognized with sufficient clearness that the lodger evil is the root of our room overcrowding problem; that our minds have been confused because of the cubic air space requirement; that we have failed to take the public with us and to keep them informed sufficiently as to the evils resulting from the conditions that we have sought to remedy, and that, especially, we have used or attempted to use a wrong method of administrative machinery. As long as we look to the irresponsible tenant as the person to hold responsible for these evils, just so long are we sure to get unsatisfactory results. What the situation requires is that we should all clearly recognize that the maintenance of a tenement house is the running of a business, and that the man who runs that business assumes definite responsibilities toward the community which he cannot escape.

My solution for this evil, therefore, is that we hold the landlord primarily responsible for the taking in of lodgers into the apartments of families who occupy his building. While it may seem a novel proposition to hold the landlord responsible for something which many people feel he cannot be responsible for, yet, it is in reality no new thing. For over ten years now in New York, we have held the landlord responsible for the moral character of his tenants, and we have done this most successfully. In the New York Tenement House Law a landlord is responsible, and with a very serious degree of responsibility, for the presence of prostitutes in his tenement house. If such women are found and are not promptly removed from the house upon notice from the public officials, the house itself becomes liable to a penalty of one thousand dollars ($1,000)—a penalty which cannot be escaped. This provision has proved so admirably adapted to its purpose that in all this time, although there have been many cases of this kind brought, there has been no instance where it was necessary to seek the collection of the penalty or the bringing of court proceedings in order to make the landlord comply with the law. A mere notice has been all that was necessary to secure action. He has been quick to dispossess tenants of this character.

What I propose now is that we should apply this same principle to the problem under consideration; that we should prohibit the taking of lodgers and boarders into an apartment without the consent in writing of our Health Officials and that we should then hold the owner of the house responsible through heavy penalty for any violation of this provision. Let us not be deceived by any false claims on the part of the landlord that he cannot know what is going on inside the apartments of the individual families in his building. Such a claim is not true. It is his business to know whether his tenants are taking in sub-tenants; it is his business to so look after his property that he will know what is going on in his house; it is his business if the house is one of any considerable size to have on the premises a resident janitor or caretaker, to keep an eye on all of the conditions in that building. The janitor always knows when families are taking in lodgers or boarders. It would be impossible to escape such knowledge. Where the house is merely a small one, and no janitor is provided, the owner himself must act as janitor, but in such houses, as a rule, the lodger evil is not often encountered.

Some may ask would it not be simpler to prohibit outright the taking of lodgers in a tenement house. Undoubtedly it would be easier, but, unfortunately, it would not be fair or reasonable, nor would such a requirement, in my judgment, stand the test in the courts. To withstand such a test successfully, it would have to be shown in all cases that the practice of taking in lodgers was injurious to the community; the exercise of the police power by the state would have to be justified.

Moreover, it would work real hardship in many cases. Take the case, for instance, of a high-class apartment house (which must, under our tenement house laws, be considered as a tenement house) where one of the tenants is suddenly left a widow and has on her hands a large apartment at an expensive rental, she must in order to live, take in one or two persons to enable her to meet her obligations. Under such circumstances, the taking in of lodgers, as we all readily admit, is fraught with no evils and is a perfectly proper thing to countenance. It is seen, therefore, that we cannot go to the extent of absolute prohibition. We must, accordingly, leave in the hands of our Health Officials the right to say when lodgers may be taken and when they may not; let us not attempt to establish in our laws arbitrary and fixed standards; but let us leave the decision to be determined by the responsible public official with regard to the particular facts in each case.

The following provision of law I would suggest should be incorporated in all housing laws and also adopted by our Health Departments as part of their sanitary codes:

> "No tenement house, nor any part thereof, shall be used for the letting of lodgings without the consent in writing of the Board of Health, nor shall any person not a member of the family be taken to live within an apartment occupied by any family, without such consent. It shall be the duty of the owner of such tenement house to see that the provisions of this section are at all times complied with, and a failure to so comply on the part of any tenant, after due and proper notice from him, shall be deemed sufficient cause for the summary eviction of such tenant and the cancellation of his lease."

With such a law and with an awakened public sentiment realizing keenly the dangers of room overcrowding, it would be possible in a short time to nip this evil in the bud in practically all of our cities, except of course, always, the City of New York. There the same remedy is required but, owing to the extraordinary conditions which prevail in that city, a long period of time will be required to bring about a change in the situation, as the evil has grown so rapidly and conditions have been neglected for so long.

With a provision of this kind on our statute books the methods of administration to be employed will be comparatively simple. From the point of view of the enforcing officials what will be required will be in the first place a very complete notification to the owners of all tenement houses of the new requirement and a warning that the responsibility now rests upon *them* and that any deviation from the strict letter of the law in this regard will be rigidly punished in future. The Health Department will also be under the necessity of having initial inspections and measurements made of all rooms in those portions of the city where they expect the evil is most likely to occur, so that they may have on file in their own records, in convenient form, readily accessible the exact number of adults and children that may be permitted with safety to occupy each individual suite of rooms. Following this measurement, written notice should be sent to the owner informing him of the maximum number of persons that may be lodged in the individual apartments of his building, and calling his attention to the fact that no persons except those to whom the apartments are let may be taken to live there without the consent in writing of the Health Department.

Then, from time to time, night inspections would have to be made by the health officers and, where it was found that lodgers were being taken, court proceedings would have to be instituted against the owner. Presumably it would be wise policy, in the first instance, to warn him and to threaten court proceedings in the next case that occurred in his house; then keep a very close watch upon his property.

So much for our Health Officials. How would such a plan work with regard to the landlord? What methods would he have to adopt in order to make this plan a success? If he were a wise landlord he would put a clause into the rent receipt which is given each month to the tenant, calling attention to the fact that no one can be taken to live in the individual rooms of that apartment without his consent and without the written consent of the Health Department; he could also state in his lease that the apartment is rented to this particular family, consisting of so many persons; a method that is now generally employed in the case of high-class apartment houses, in which class of realty the standard lease contains a clause that the apartment shall not be sublet without the landlord's consent. If he were a wise landlord he would also give a similar printed notice to the tenants upon their first moving into the house; thus calling their attention to the limits of the occupancy before they actually moved in. He would also cause his janitor to be vigilant and see that no lodgers were taken into the house, nor would he wait for the health officials to discover the presence of this abuse, he would discover it himself and deal with it accordingly. And finally if he should receive a notice of violation from the Health Department, a first warning, he would without the least hesitation dispossess the tenant.

That such a plan is sure of successful administration, there can be little doubt. That such a plan would, if fairly administered, do away with room overcrowding in most of our cities, I similarly have no doubt. What is required now is that it should be adopted as a basis of practical operation for the future, assuming it commends itself to the judgment of our health officials and our housing workers.

Two points of vital importance must not be lost sight of; one is something that we are apt to forget, namely, that the tenement dweller knows that it is wrong to take in lodgers. I am sure there is not one of us, whether social worker, housing reformer or health official, who has not uniformly been made aware of this in his dealings with the tenants. The tenant is quite conscious that the taking in of lodgers is against the law, even in many cases where it is not, believing it to be so—and is always careful to conceal the facts so far as he can. This makes the situation helpful; for, in carrying our plans into effect, we shall not have to impose upon the working people requirements which may seem to them new interference with their liberty.

The other vital point is that we cannot succeed in this effort unless we see to it that the community is thoroughly aroused to the evils of room overcrowding and is kept aroused; not only must we educate the general public, but we must give especial attention to the education of our minor courts. The judges before whom cases of this kind must go must be made to see at first hand the serious consequences of this evil. Excursions must be arranged by which they can accompany the sanitary officers on their midnight inspections and can see for themselves the conditions which prevail. Through conference with social workers and prominent citizens, they must be made to realize the strong public sentiment that there is in the community for the doing away with these evils.

If we are to do away with the lodger evil, our remedies must be twofold, repressive and also constructive. We must not only make impossible by law the taking of lodgers into the family life, but we must recognize that there is need of some place in which the large number of single men that come to our shores—single so far as we are concerned, that is, men without families in this country, can be cheaply lodged. We must recognize too, the necessity of their being lodged near their fellow-countrymen, so that they may be near people that speak their language and who have common interests.

This means, therefore, that in our large cities, where there is a considerable alien population, we must carefully find out the facts as to the need of housing accommodations for single laborers of this kind, and see to it that lodging houses of the very best type are provided for their accommodations, placing one of these in each alien center, and not attempting to house the various races in the same house. They will not mix, so do not let us attempt it, but let us rather build a lodging house for Italians in the Italian quarter of our cities; similarly a lodging house for Poles in the Polish quarter of the city, and so on.

Here there is great opportunity for our philanthropists. It is pioneer work; the ground has to be broken from the very beginning. We have yet to learn what is the best type of lodging house to build, the whole question is still to be studied in all its aspects.

I have every confidence that with the adoption of these plans room overcrowding will in the course of a few years cease to be a factor in America's housing problem. But this result cannot be accomplished unless we set ourselves resolutely to work. What is needed is not discussion but action. The way to begin is to begin, and the time to begin is now.

A STUDY OF THE DEATHS FROM TUBERCULOSIS IN THE FIFTH WARD (PHILADELPHIA) DURING A PERIOD OF FORTY-SEVEN YEARS.

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In the crusade against tuberculosis it is of the utmost importance, especially in the formulating of health regulations for a large community, that our principal attack should be directed toward that point where most of the infections occur. In determining this point it is essential that we have accurate information in regard to certain phases of what might be termed the "natural history" of the disease.

Do most of the infections occur in the public streets, conveyances, or meeting places; in the work-shops or factories; or in the home itself? This study of the deaths occurring in one ward of a large city over a considerable period of time was made with the idea of throwing some light on this question. Its main object being to determine to what extent house infection might be considered a factor in the spread of the disease.

DESCRIPTION OF THE FIFTH WARD.

The Fifth Ward was selected as it was the ward which Doctor Flick selected as the subject of his valuable contribution to the study of this disease in 1888 (The Contagiousness of Phthisis—Trans. Med. Soc. State Pa.). Much of the data which he collected at that time he very kindly placed at my disposal.

It is a ward the population of which is made up largely of Russian Jews and Negroes with a few Italians, Slavs, and Irish. In the earlier years under consideration the population consisted chiefly of Americans and Irish, later the Negroes predominated, but of late years the Russian Jews are in the majority.

The inhabitants belong to that class of people which is not accustomed to a long residence in any one place, but frequently change their dwelling, usually moving to another house in the same neighborhood. This was very clearly shown when we attempted to study the relation between the present series of cases and the patients attending the dispensary or hospital of the Henry Phipps Institute who had at one time lived in the Fifth Ward. It was found that the patients moved so frequently that it was impossible to determine the exact time in which they had occupied a certain dwelling and the study was on that account discontinued.

There are very few large tenement houses in the district, although it is not uncommon to find two or three families occupying the same house, usually one family to a floor. A large portion of the ward is now taken up by offices, storage-warehouses, etc.

OBJECTIONS.

A study based upon the death returns is open to criticism on many grounds as there is such a large margin of error. This is especially true of the death returns in Philadelphia prior to 1890. The following are some of the sources of error:

First: Deaths due to tuberculosis may be returned as some other disease, through error in diagnosis or through the physician desiring to give the family the benefit of the doubt, where such exists, for the sake of the insurance or on account of the popular prejudice against this disease, especially among the Irish.

Second: In former years the undertaking establishment or hospital was given as the place of death and the former residence was not stated. In either case we were not able to consider these deaths (404) in the present study as we had no means of determining the former residence of the patient.

Third: The address was at times so indefinite that the exact location could not be considered in the present study.

Fourth: The terminology was formerly very indefinite at times, terms being used which are now obsolete, and, therefore, a certain number of deaths from tuberculosis may have been overlooked in collecting our data. We have included in the present series all deaths due to phthisis pulmonalis, consumption, pneumonic phthisis, miliary and general tuberculosis, tuberculous meningitis, enteritis, nephritis and peritonitis, scrofula, Pott's disease, hemorrhage of the lungs and catarrh of the lungs.

Fifth: We are unable to show in any of our cases how long the patient had been ill, how long he had occupied the dwelling, or which portion of it he occupied. We could not determine whether the succeeding case was living in the house at the time the preceding case died, or how soon after the death of the first it was occupied by the second, or whether the second occupied the same quarters as the first. Neither can we show how cleanly the first case was or whether he carried out any measures of prevention.

Sixth: Another source of error is the impossibility of excluding other possible sources of infection in the individual case.

These points of weakness in the present study should all be borne in mind when considering the value of the results and the conclusions based on such results.

HOUSE INFECTION.

We possess very definite information in regard to the *possibility* of house infection obtained by very careful investigation which can be applied to the present study, rendering our conclusions more than merely suggestive especially as the number of cases considered is large.

It has been clearly demonstrated by Cornet (Zeit. f. Hyg. 1888, Bd. V) and other observers that *virulent* tubercle bacilli may be found present in the room occupied by a careless consumptive as long as six weeks after the death of the patient. Coates (Brit. Tuberc. Congress Vol. 11, p. 88) has shown that the mode of living has a definite effect upon the frequency with which the bacilli are found. In his investigation virulent bacilli were found in 66.6 per cent of the dirty houses which had been occupied by a consumptive and in only 50 per cent. of clean houses. From a personal experience with the houses under consideration the writer is of the belief that a conservative estimate would place 75 per cent. of the houses in the first group.

It is impossible to refer to the numerous instances cited by various writers in which tuberculosis has developed in persons previously healthy after occupying dwellings recently occupied by consumptives. We are convinced that the possibility of infection with tuberculosis from an infected house has been clearly established, our effort in the present study being merely to attempt to show to what extent house infection may be considered a factor in the spread of the disease.

TOTAL DEATH RATE FROM TUBERCULOSIS.

To show the relative position of the ward in regard to the rest of the city, as far as tuberculosis is concerned, we have prepared a chart giving the annual death rate per thousand of the living population (Chart 1) for the entire forty-seven years. As the ward constitutes only about one eightieth of the entire population of the city (16,868 in a population of 1,293,000 in 1900) the ward rate naturally does not follow the city rate at all closely, It will be seen, however, that although the ward rate occasionally falls slightly below the rate for the entire city, it more frequently rises above it and at times to a marked degree. This will probably give one a more accurate idea of the type or character of the ward than any method that could be employed. There is a very striking and sustained rise above the city rate from 1880 to 1889. It is very difficult to explain this rise except on the ground that it was possibly about the period during which the Negro population in this ward was at its height. For the rise from 1904 to 1909 we have not adequate explanation unless the establishment of the Henry Phipps Institute led to a more frequent diagnosis of tuberculosis.

RELATION BETWEEN DEATHS, POPULATION AND HOUSES.

From the year 1863 to 1909 (inclusive) there occurred in the Fifth Ward 2,849 deaths from tuberculosis. Of this number 404 were returned from undertaking establishments and hospitals, and 196 gave addresses so indefinite or incorrect that we are forced to discard them. This leaves us with 2,248 deaths in which the residence was definitely determined.

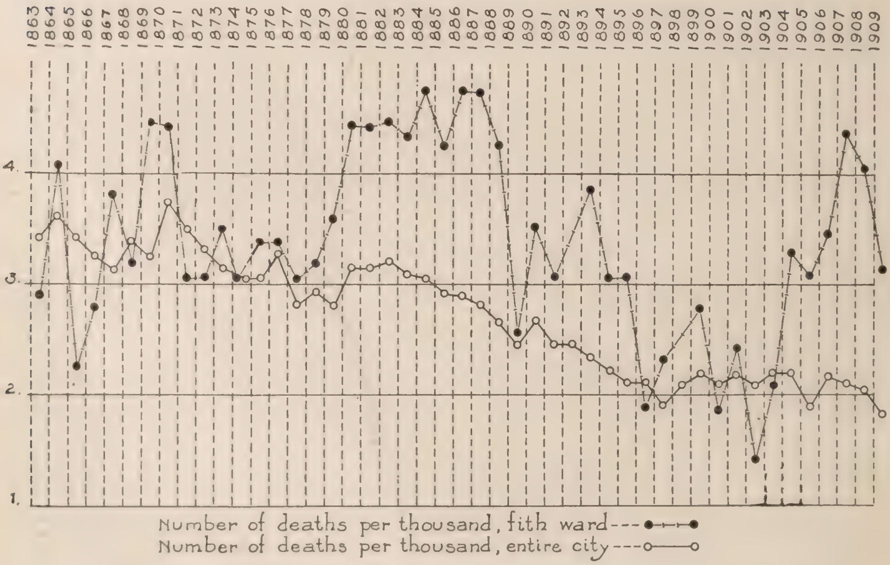
A study of these gives the following:

A.	Total number of streets in the Fifth Ward	67
	Number of streets in which deaths occurred	57
	Percentage of streets in which deaths occurred	85%
B.	Total number of deaths for 47 years	2,248
	Total number of houses in which deaths occurred	1,312
	Average number of deaths per house infected	1.7
C.	Total number of houses in Fifth Ward (1909)	1,676
	Total number of houses in which deaths occurred	1,312
	Percentage of houses in which deaths occurred.	78%
D.	Total number of houses	1,676
	Total number of deaths	2,248
	Average death per house	1.3
E.	Average number of deaths per year	47.8
	Average population	17,657
	Average number of deaths per 1,000 population	2.7
F.	Number of streets in which three or more deaths occurred	20
	Number of houses in which three or more deaths occurred	62
	Total number of deaths occurring in these houses	252
	Average number of deaths per house	4.06
G.	Total number of houses in which deaths occurred	1,312
	Total number of houses with three or more deaths	62
	Percentage of houses in which deaths occured having three or more	4.7%
H.	Total number of deaths in ward	2,248
	Number of deaths occurring in 4.7 per cent. of houses	252
	Percentage of deaths occurring in 4.7 per cent. of houses	11.2%
J.	Total number of inhabited houses	1,676
	Number of houses in which 11.2 per cent of deaths occurred	62
	Percentage of total houses	3.6%

A study of the above shows that in a period of forty-seven years a very high percentage of streets (85 per cent.) and houses (78 per cent.) (*A. and C.*)

have had one or more deaths; that the deaths averaged 1.3 (*D.*) to every dwelling in the ward. When we come to consider the houses in which three or more deaths occurred we are struck with the fact that 11.2 per cent. (*H.*) of all deaths in forty seven years occurred in a very small proportion, 3.6 per cent (*J.*) of the houses in the ward. Showing that the deaths from tuberculosis tend to be confined to only a few dwellings, these dwellings in the present series averaging 4.96 deaths per house. This was much more strikingly shown by Doctors Biggs and Guerard (Report of Board of Health of New York City, 1897) in their study of the conditions in New York City when they found 55.8 per cent. of the cases of tuberculosis in 10.5 per cent. of the houses. They considered reported cases as well as deaths, and were dealing with a much more congested population (27.6 individuals per house) than in the ward we are considering at present (10.27 individuals per house). Their study covered a period of only three years.

CHART 1.



We found that 24 per cent. of all deaths occurred in houses in which a previous death from tuberculosis has occurred. As our study covered a period of forty-seven years it makes it possible for the previous deaths to have occurred forty-six years before the second, under which circumstances it would be beyond the range of possibility for the second death to have had any relation to the first.

SELECTION OF TIME PERIOD.

In trying to decide what period of years to allow for the possibility of infection from the first case to the second, the following factors were considered:

First: How long before death could the patient be considered infectious to other people living in the same house.

Second: How long the average case lived after infection.

Third: How long after the death of the first case could the house be considered infectious to a second party moving into the dwelling.

After a very careful consideration of all the factors involved, in the absence of any definite data in regard to any individual case, we considered a period of *four years* (for example, the first death in 1900, second death in 1903) to be a reasonable interval considering that we are dealing with *deaths.* We have, therefore, studied the present series of deaths with the object of determining how many deaths occurred within a period of four years subsequent to another death. While the period of years selected is purely empirical it is at the same time a very conservative estimate for the period of *death to death* (not death to infection or death to signs of disease).

STUDY OF CASES WITHIN FOUR YEARS PERIOD.

Of the 2,248 deaths 353, or 15.7 per cent. of the total number, occurred within a period of four years following a previous death in the same house. This does not include the primary case, but only the subsequent cases. In other words, 15.7 per cent. of all the deaths in forty-seven years were possibly due to house infection. Of the 353 cases, 62 were apparently related. Omitting these we still have a percentage of 12.9. Of the 540 cases occurring in houses in which a previous death had occurred 65.3 per cent. of them came within the four-year period.

When one considers the relative frequency with which one obtains a history of a previous death from tuberculosis in the house in which the patient lives, outside of a member of the immediate family, the above percentages are astonishingly high. The only means we possessed for determining relationship was the similarity of the names. We consider our estimation as probably correct as the people with the same name and not related would probably balance those related but with different names.

A study of these 353 cases shows the following:

A.	Number of streets in which case died within 4 years of another	39
	Number of houses in which case died within 4 years of another	242
	Number of cases in which case died within 4 years of another .	353
	Average case per house	1.04

B. Total number of houses in which deaths occurred	1,312
Total number of houses having cases dying within 4 years of another	242
Percentage of houses in which deaths occurred having cases dying within 4 years of another	18.4
C. Total number of deaths in ward	2,248
Deaths occurring in 18.4 per cent. of houses	353
Percentage of deaths in 18.4 per cent. of houses	15.7%
D. Total number of inhabited houses	1,676
Number of houses in which 15.7 per cent. of deaths occurred	242
Percentage of houses in which 15.7 per cent. of deaths occurred	14.4%

We see from the above that during forty-seven years 14.4 per cent. (*D.*) of all the houses in the ward or 18.4 per cent. (*B.*) of all the houses in which a death from tuberculosis occurred contained 15.7 per cent. (*C.*) of all the deaths which could be possibly due to house infection or infection in the house.

We do not believe that the figure 15.7 represents by any means the percentage of cases infected in the house, but we do consider that it does show that infection from the house is much more frequent than is usually considered and that this phase of the tuberculosis problem has not received sufficient attention.

ELAPSED TIME AND RELATIONSHIP.

When we come to consider the relation in point of time of the second death to the first we find the following:

Same year as first, 82 or 23 per cent. of which 23 or 28.1 per cent. were related.
Following year, 108 or 30.6 per cent. of which 19 or 17.6 per cent. were related.
Second year, 93 or 26.4 per cent. of which 16 or 17.2 per cent. were related.
Third year, 70 or 20.0 per cent. of which 5 or 7.1 per cent. were related.

This brings out in a very striking manner the fact that contagion from a member of the same family probably preceded the death of that member by several years. In this way only can we account for the higher percentage of deaths of relations in the same year. This will be considered further when we take up the question of infection in children.

DEATHS FROM TUBERCULOSIS IN CHILDHOOD.

Bovine Infection.

When we study the deaths from tuberculosis in children under the age of seven years another point of interest is brought out. As this is of extreme importance in its relation to the question of bovine infection we have considered it worthy of a separate study. We have, therefore, attempted to show how many fatal cases of tuberculosis in childhood had occurred in a house in which a case had previously died from tuberculosis within four years. Of the 182 deaths in children, 52 or 28.6 per cent. occurred in a house in which a case had died within a period of four years from tuberculosis. In twelve instances they appeared to be related to the previous case. The fact that we find such a large proportion (28.6 per cent.) of deaths from tuberculosis in children occurring in houses in which a death from the same disease has occurred within the four years preceding, would certainly tend to support the view that the majority of infections in childhood are of the human rather than the bovine type. That this percentage is higher in children (28.6 per cent.) than in adults (14.5 per cent.) might be accounted for by the shorter duration of the disease in children thus bringing more of them within the four years period. In two instances death occurred in a child in the same house in which a child had previously died from the same disease within four years. Of the 182 cases occurring in children the following were given as the cause of death

Phthisis pulmonalis	110	(60.4 %)
Tuberculous meningitis	47	(25.8 %)
Tabes mesenterica	6	(3.34%)
Pulmonary hemorrhage	3	(1.62%)
Tuberculous peritonitis	3	(1.62%)
Miliary tuberculosis, hemorrhage, consumption of bowels and catarrh of lungs	2	(1.62%) each
Scrofula, tuberculous pneumonia, tuberculous hip-disease, infantile consumption and generalized tuberculosis	1	(.54%) each

As to how soon death occurred after the previous case of tuberculosis in the same dwelling the following refers to thirty-five children:

Same Year.	*Following Year.*	*2d Year.*	*3d Year.*
13 (37%)	7 (20%)	7 (20%)	8 (23%)

For (318) adults we have the following:

Same Year.	*Following Year.*	*2d Year.*	*3d Year.*
69 (21.7%)	101 (31.8%)	88 (27%)	62 (19.5%)

It will be noticed that in the children the highest percentage of deaths occurred in the same year, while in the adults in the following year. This may be explained by the longer duration of disease in adults as compared to the children in which it runs a relatively rapid course.

ELAPSED TIME AND RELATIONSHIP.

Deaths during same year in the children, 46 per cent. were related.
Deaths during same year in the adults, 24.6 per cent. were related.
Deaths during following year in the children, 14.3 per cent. were related.
Deaths during following year in the adults, 17.8 per cent. were related.
Deaths during second year in the children, 14.3 per cent. were related.
Deaths during second year in the adults, 17.4 per cent. were related.
Deaths during third year in the children, 0 per cent. were related.
Deaths during third year in the adults, 8 per cent. were related.

This shows in a very striking manner the condition one would expect to find, namely: Firstly, in children the close family relationship and the more rapid course of the disease gives a higher percentage of deaths in the same year. Secondly, the family relationship ceases to be an important factor after the end of the second year. Thirdly, on account of the longer duration in adults the following and second years show a slightly higher percentage not only in the totals but also in those related.

Taking the total cases we find that of the thirty-five children eight (22.8 per cent.) were related, while in the 318 adults fifty-five (17 per cent.) were related. The percentage is slightly higher in the children on account of the much closer contact with the home than is found in the adult. The difference, however, is not so striking as one would expect to find.

WIDTH OF THE STREET.

It has been stated that the width of the street bears a definite relation to the number of deaths from tuberculosis. H. S. Anders (Univ. of Penna. Med. Mag., 1891) found in another ward in this city that the greatest number of deaths from consumption occurred in the small streets or blind alleys, and that relatively few occurred in the broader streets. We feel that the only basis upon which such a statement could be made would be upon the study of the deaths in relation to the number of people living in such a street. As we have no reliable information upon this point in regard to the Fifth Ward, we have taken the deaths occurring on each street and reduced them to the same factor (seven squares long, both sides of the street), as it would be unjust to compare the number of deaths in a street seven squares long to the deaths in one only one-half square long. We have upon this basis arranged our streets according to widths in Chart 11. It must be remembered, however, that the number of deaths given under the heading "Estimated" is not the actual number of deaths but the actual number reduced to a common factor.

In studying the above one notes that the average number of actual deaths per street increases gradually from 8.3 deaths per street in those under 10 feet in width to 93.0 deaths per street in those over 40 feet in width. It will be seen that the streets under 10 feet in width only aver-

Chart 11.

Width of Street.

	Under 10	10–20	20–40	Over 40
Number of streets	10	18	10	17
Average length of street	.5	1	1.9	6.5
Total number of actual deaths	83	291	283	1581
Average number of *actual* deaths per street	8.3	16.1	28.3	93
Minimum number of *actual* deaths per street	1	1	1	1
Maximum number of *actual* deaths per street	40	70	93	294
Total *estimated* number of deaths	844	1705	853	1783
Average *estimated* number of deaths	84.4	94.7	85.3	104.8
Minimum *estimated* number of deaths	21	7	14	2
Maximum *estimated* number of deaths	196	490	217	294

aged .5 of a square in length while those over 40 feet in width averaged 6.5 blocks in length. It is obviously unfair therefore to compare the number of deaths to one another. If we reduce them to a common factor we find the greatest average number of deaths per street in those over 40 feet (104.8), then those 10–20 feet (94.7), then the 20–40 (85.3) and the smallest number in the streets under 10 feet in width (84.4). As this does not take into consideration the number of people living in the various streets we feel the findings have absolutely no significance.

CONCLUSIONS.

Fully realizing that a study like the present based upon data of so indefinite a nature might readily lead to erroneous views if too closely adhered to, we nevertheless feel justified in drawing the following conclusions:

First: With the information at our command we could determine no relation between the width of the street and the number of deaths from tuberculosis.

Second: That a large percentage of the deaths from tuberculosis occur in a relatively small percentage of the houses.

Third: That in tuberculosis house infection must be considered as one of the most fruitful sources of infection, and should, therefore, be made the object point of any attack upon the disease.

Fourth: As in more than one quarter of the deaths from tuberculosis in children the possibility of contagion from house infection can be clearly demonstrated we feel that efforts toward prevention should be mainly directed against the human source of infection rather than the bovine.

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HOUSING AND HEALTH.

Thoughtful observers of the health work of this country have for some time past realized that, if such work is to take its rightful place in public estimation, it must have a well-organized and informed public sentiment behind it. That it has not had this support heretofore has been only too obvious; why it has been without it has not been so apparent. The chief reason has been that the health officials have not sought it, but have waited for private citizens to take the lead. The result has been what one would naturally expect—our Health Departments have been with few exceptions notoriously under-manned and under-financed.

While each year the work of the Police and Fire Departments in all our cities has secured increased financial support, our health Departments have in most cases stood still. Most cities in America today spend ten times more money to protect property than they do to protect health.

That the prevention of disease is the most important subject that can occupy public attention has as yet been realized by but few public officials in most of our cities. Increased appropriations are made grudgingly, and everywhere throughout the country earnest and broad-minded health officers have become discouraged and are giving up the effort as hopeless. The fault is largely their own. They have failed to take the public into their confidence. They have failed to draw upon an almost inexhaustible reservoir of public support.

In the light of these considerations, the Second National Housing Conference, held in Philadelphia last month, has especial significance for the health officers of the country. It points the way to broad fields of usefulness. In every part of the United States there has been an awakening to the dangers of the slum. Stimulated by the anti-tuberculosis movement and by the work of the National Housing Association, groups of people, not only in large cities, but in town, suburb and village, are alive to the dangers of bad living conditions and are demanding the enactment of better housing laws, their strict enforcement and new and advanced standards of sanitation.

Here lies the opportunity of the health official. By taking the lead in this movement, by calling to his aid those citizens who either are interested or naturally would be interested in the improvement of the living conditions of the less fortunate members of the community, he will build up a strong public sentiment for the preservation of health and the prevention of disease.

HYGIENE AND DECENCY: OR SENTIMENT IN SANITATION.

Travelers may often see in railway carriages in Italy the notice—*Per Igiene e Decenzia non Sputare* (For Hygiene and Decency do not Spit).

There is here a lesson for sanitarians. Dirt is not always deadly or even dangerous, and those who teach that dirt is necessarily disease producing will find difficulty in explaining the often long continued and robust health of workers in sewers or upon streets or about garbage piles or in stables or dusty trades. The fact is that so much of what passes for "dirt" is not really excrement (as the word implies) or likely to produce serious disease, that some other reason than imminent danger to life and health must be found for holding that cleanliness is next to godliness. Such a reason sometimes exists in mere decency and therefore in sentiment or good taste. No matter how harmless it may be to soil the hands with stable manure, such soiling offends our sense of decency and good taste, while even if it should be established that spitting is one of the least important methods for the spread of tuberculosis and other infections, it will still be true that the spitting habit must be denounced in the interests of decency.

The fact is that sentiment,—doubtless fortunately,—still plays a mighty part in the world, and that the public is, and ought to be, glad to pay for decency as well as for safety in food and drink. The moral is obvious. *Per igiene e decenzia non sputare.* Teachers of hygiene and sanitation should not forget to enforce the idea that these sciences stand for cleanness hardly less than for disease prevention. Some cities with dirty streets very likely have lower death-rates than some with clean streets; some families in dirty homes less sickness than some in clean ones; and yet it does not follow that cleanness is superfluous. Fire and death very likely do not occur any less often among the insured than among the uninsured, but when they do occur the insured are the better off, and this is probably the basis of the general opinion of mankind that both fire insurance and life insurance are worth while. It is very likely for some such reason as this that public opinion requires cleanliness—an opinion which like many other opinions has finally become a sentiment; for cleanliness is a kind of insurance,—not always sufficient to prevent disease but still always worth while.

THE 37° BACTERIAL COUNT.

George C. Whipple.

Read before the Laboratory Section American Public Health Association, Washington, D. C., September, 1912.

In 1905 the Committee on Standard Methods of Water Analyses, in its final report to this Association, included among its recommendations the use of nutrient gelatine as the standard medium for the determination of the number of bacteria in water, with a period of incubation of forty-eight hours at 20° C. This was done after an extended correspondence with the leading workers of this country and a tabulation of current practice, described in the second progress report of the Committee in 1901, which showed a practical unanimity in favor of the recommendation. During the past seven years this standard has been recognized and in most laboratories great care has been taken to adhere closely to the prescribed conditions, expensive incubators for automatically maintaining a temperature of 20° having been frequently introduced.

Since 1905 there has been a feeling on the part of some bacteriologists, especially those whose chief interest is in hygienic matters, that the gelatine count at 20° C. is not in itself sufficient, and should be supplemented by a determination of the number of bacteria that will develop on an agar plate incubated for twenty-four hours at 37° C. Still others consider the latter to be so far superior to the former that they prefer to make it the standard medium to be used in all cases, letting the 20° gelatine count fall to a subsidiary place. The present Committee on Bacteriological Methods of Water Analyses has taken this view and in its report made at the Havana meeting in 1911, recommended that "The standard method for determining the number of bacteria in water shall be nutrient agar. All variations from this medium shall be considered special media. If any medium other than standard agar is used this fact shall be stated in the report." In explanation of this the report states further that "since gelatine does not give the total number of bacteria in the water, the committee has thought it wise to use agar incubated at 37° C. as a standard medium. This admits of counts in one day instead of two and gives results on the kind of bacteria growing at blood temperature and therefore, more nearly related to pathogenic types."

The report of this committee has been recently published together with the report of the Committee on The Chemical Analysis of Water.

This sudden change in the standard method of determining the number of bacteria in water has thrown something like consternation among bacteriologists connected with water filtration plants who find that they must change their methods of investigation, or be open to the charge that they are not using standard methods of procedure. In order to see how this change of standard was regarded by men in charge of filter plants, the writer recently wrote to about twenty of the leading filter operators. Eighteen replies were received. Of these eleven preferred to use the 20° gelatine count, four favored the 37° agar count, while three did not wish to express an opinion until they had tried both methods side by side for a sufficient time. The unpopularity of the change among this important group of bacteriologists has been found to be such that the writer has ventured to bring this subject up for discussion at the Laboratory Section by enumerating the relative advantages and disadvantages of the two methods in connection with the control of filter plants.

In the first place it should be recognized that water filters have a dual function,—that of furnishing water that is clean and water that is hygienically safe, although considered broadly, the former may be taken to include the latter. Filtered water should be free from pathogenic bacteria, from bacteria associated with fecal matter, and from bacteria associated with decomposing organic matter from other sources. We know that such bacteria as B. typhi are dangerous; we suspect that other bacteria of fecal origin may be dangerous; and we are coming to suspect that some of the bacteria associated with the decomposition of organic matter not of fecal origin may not be without influence on the human system. It is a question as to whether some of the common bacteria that liquefy gelatine, for example, and that are commonly found in surface waters, do not play a part in the diarrhœal disturbances of children. This division corresponds somewhat roughly with the common expressions, infection, fecal contamination and pollution.

Our bacteriological tests should be aimed at these three groups of bacteria, and as far as possible, should be made quantitative. Specific tests for pathogenic bacteria cannot be safely depended upon at the present time, although decided progress in this direction is being made, as for example, in the detection of the germs of cholera and typhoid fever.

The most important test for fecal bacteria is that for B. coli,—a test that has been recently much improved and simplified, and that is capable of being made quantitative as well as qualitative, although the labor involved is ordinarily too great for routine work.

The 37° agar count is commonly regarded as a test which, while it is not limited to fecal bacteria, draws the line more closely around them as it eliminates bacteria not capable of growing at the temperature of the human body. Attempts have been made to make this more definite in a variety of ways by the addition of various inhibitive substances, but no method seems to have received sufficient sanction to warrant its general use, the count of acid-producing colonies on lactose litmus agar at 37°, being perhaps the test more commonly used than any other.

The 20° gelatine count does not by any means show the total number of bacteria present in a sample of water. No test will do this. This method, however, comes as near to it as any practical test that has been suggested. It is a favorable culture medium for such pathogenic bacteria as B. typhi, for bacteria of fecal origin such as B. coli, as well as for numerous saprophytic bacteria.

The usefulness of any method of determining the number of bacteria in water in connection with filtration must be judged by: (1) The value of the results as an index of the quality of the water and the efficiency of the filter. (2) The precision of the test. (3) The convenience of the test.

Convenience of the 37° Test.

Gelatine is easier to prepare than agar and requires less time. It is better adapted to the purposes of field work than agar, in that it is easier melted, and adheres better to the glass plates, but on the other hand it is more liable to melt. The colonies on gelatine are more distinct and while some may be masked by the liquefication of the gelatine, this loss is no greater than that caused by the spreading of colonies over the surface of agar plates. In these respects, therefore, the advantage lies with gelatine.

On the other hand, it is extremely difficult to maintain an incubator at 20° C. If the temperature rises only a few degrees the gelatine is melted and the result lost, whereas if the temperature falls much below 20° growth is retarded. During the winter surface waters may contain species of bacteria that develop much more rapidly at temperatures below than at 20°. Incubators can be maintained at 37° without much trouble and with considerable accuracy. Such an incubator is needed for B. coli tests, and hence, one incubator will serve both purposes if the bacterial count is made at 37° instead of 20°. The 37° count is obtained after twenty-four hours, whereas the gelatine count requires forty-eight hours. This gives the results in half the time and enables a larger volume of work to be done with a smaller supply of plates.

The spreading colonies, so troublesome with agar used in ordinary Petri dishes, are largely done away with by the use of dishes with porcelain tops. These ought to be cheaper than glass. The figures obtained from the 37° counts are smaller than those at 20° and this facilitates tabulation. On the whole, so far as convenience is concerned, the weight of the evidence seems to be in favor of the use of the 37° count rather than the 20° count.

RELATIVE PRECISION OF THE COUNTS AT 20° AND 37°.

This is a matter about which information is meagre. It deserves study in order to determine whether the natural variations in different lots of culture media are of greater influence with gelatine or with agar.

In this connection it should be noted that the recent committee report recommends the use of 1 per cent. agar for quantitative work instead of 1.5 per cent., as prescribed by the previous report. Some bacteriologists who have tried this 1 per cent. agar have not been able to obtain a usable medium, as it was not stiff enough to prevent the colonies from running together. A few experiments made with agar of different percentages have shown that the spissitude, or stiffness of the medium very greatly affects the results, much higher counts being obtained with 1 per cent. agar than with 1.5 per cent. agar. Jackson has recently shown that commercial agar contains more or less water, and in describing the method of preparing agar for typhoid identifications, he has recommended that the agar be dried for 30 minutes at 105° C. before being weighed. This precaution would appear to be advisable also in connection with the preparation of agar for quantitative work, and it would be well to have it explicitly stated in the standard methods.

THE 37° COUNT AS AN INDEX OF CONTAMINATION.

That the 37° count more nearly represents the sanitary quality of water than the 20° count is probably true in a general way, but it is not necessarily so. Comparisons of the results obtained by both methods in samples of water of known pollution have shown that, generally speaking, in unpolluted waters the ratio of the 37° count to the 20° count is low, seldom being more than 10 per cent. and not infrequently falling to less than 1 per cent. In sewage the ratio is usually above 60 per cent. and may be 100 per cent. or more.

In looking over the published data, it has been surprising to find in how few instances comparative counts at 20° and at 37° have been systematically made. Where these have been made throughout the year, it has been generally found that during the winter the ratio has been very much lower than during the summer. This is shown by the following figures taken from the annual reports of the Water Department at Wilmington, Del., for 1908 and 1909:

At Watertown, N. Y., where the Black River water is filtered by a mechanical filter, comparative counts at both temperatures have been made daily since February, 1910. The difference between the two counts is striking. The 20° counts are very high in the winter and spring, but are low during the summer, whereas the 37° counts are low during the

Comparison of 20° and 37° Counts of the Raw Water at the Filter Plant at Wilmington, Del.

1908.			1909.		
Gelatine at 20°.	Bile Agar at 37°.	Per cent.	Gelatine at 20°.	Bile Agar at 37°.	Per cent.
4,630	124	2.7	3,880	94	2.3
6,830	358	5.3	4,800	260	5.4
8,800	350	4.0	4,620	387	8.4
3,170	149	4.7	5,080	347	6.7
2,010	119	5.9	3,340	229	6.8
1,640	241	14.7	2,350	158	6.7
3,150	432	13.7	2,940	57	1.9
3,140	451	14.4	1,430	230	16.1
3,400	644	18.9	2,620	619	22.8
5,180	439	8.5	1,380	129	9.4
6,850	78	1.2	1,650	97	3.9
4,100	203	4.9	4,150	194	4.7

winter and spring and high during the summer, at which season the sewage which enters the stream is less diluted. The ratio of the 37° counts to the 20° counts is less than 1 per cent. during the winter, but rises to 20 per cent. or more during the summer. The tests for B. coli in the raw water are a little higher during the summer than during the winter, thus corresponding with the 37° counts. This seasonal change would have considerable significance if it were confined to contaminated waters, but to some extent it is observed in waters that are not contaminated. Recent tests at Springfield, Mass., on a stream which drains a very sparsely populated area showed ratio of 30 to 50 per cent. It is possible that the phenomenon is a seasonal one, depending upon temperature rather than upon contamination.

In the winter certain species of bacteria, which appear on the gelatine plates as minute points, are often very numerous, samples of water sometimes containing several hundred thousand per cc. These bacteria readily pass through filters, making the effluent counts high. At this time the 37° counts are low, often less than 0.5 per cent. of the 20° counts. Judged from the 37° counts alone, the inference would be that the filtered water was safer during the winter than during the summer, yet practical experience has shown that it is during the cold weather that water-borne diseases are most likely to be transmitted.

Thus it would appear that the evidence as to the sanitary significance of the 37° count in filtered water is somewhat conflicting and needs further study.

THE 37° COUNT AS A GUIDE IN THE OPERATION OF FILTER PLANTS.

The principal reasons given by the filter operators for preferring the 20° count to the 37° count were, first, that the former had been used for many years and to change now would introduce an unnecessary element of confusion; second, that if the 37° count were used the results from many of the filter effluents would be very low, and often zero, so that this method would not be sensitive enough to show slight differences in the operation of the plant.

These low 37° counts might be considered as showing a satisfactory condition of the effluent if the removal of contamination alone were considered; possibly not if pollution from other sources were taken into account. That is, the 37° count might show a perfect effluent, while the 20° count might show that the filtered water was not perfectly filtered.

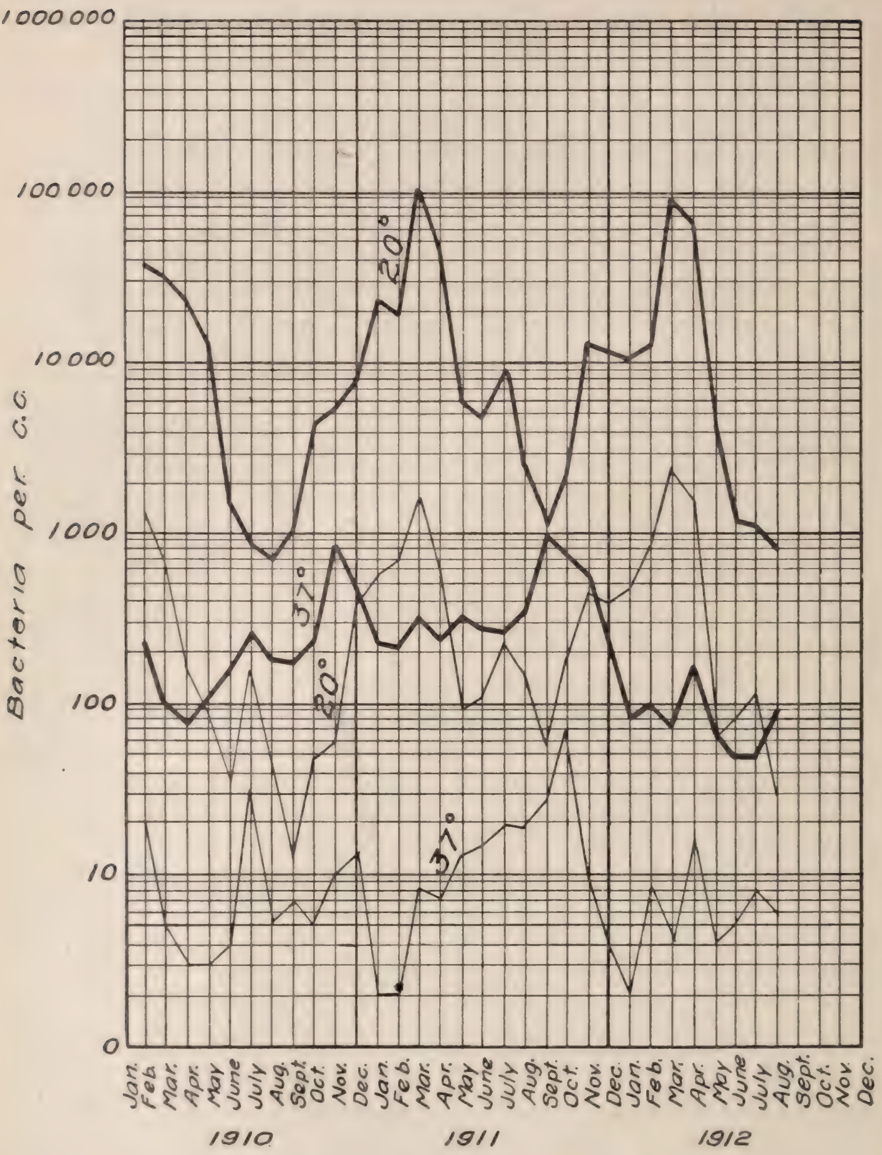
It is argued that in sand filters many of the 20° bacteria represent growths in the underdrains, but there is no evidence that such growths are altogether harmless.

So far as measurement of filter efficiency by percentage removal of bacteria is concerned, the two methods would give the same results if the ratios between the counts at different temperatures were the same for both the raw and the filtered water. As a matter of fact the ratio is not quite the same, so that, as a rule, the percentage removal of bacteria calculated from the 20° count is greater than that calculated from the 37° count. Sometimes, however, the reverse is the case. The percentage removal calculated from the 37° count usually falls during the summer, which would indicate that the filter efficiency was lower during the warm weather than during cold weather, while theory indicates that the reverse should be true. The percentage efficiency calculated from the 20° count is more nearly constant through the year, and agrees better with theory.

Another objection raised to the 37° count is that at present we do not know how to interpret the results. It is generally considered that filter effluents should contain less than 100 bacteria per cc. as shown by gelatine count. Who knows what would be the equivalent of this with the 37° count?

CONCLUSION.

All things considered it would appear to be unwise to change abruptly at this time from the 20° to the 37° count, as a guide in the operation of water filtration plants. Before this is done extended comparisons of the two methods should be made at many places and the data carefully ana-



Watertown, N. Y.
Comparison of Bacterial
Counts at 20° and 37°

Raw water shown in heavy black lines.
Filter effluent before disinfecting shown in light lines

lyzed to determine whether or not the change is advisable. Another objection to changing at this time is the possibility of using synthetic media in the future. All media composed of variable ingredients are unsatisfactory and bacteriologists are looking forward to the employment of media more definite in composition. Should such a change occur in the near future it would be better to adhere to present methods until that comes about.

It is recognized, of course, that the bacterial count has other uses than in connection with filter plants, and that for some of these uses the 37° count is undoubtedly superior to the 20° count. It is better, for example, for studying the purification of sewage, the contamination of shell-fish, and for the analysis of milk. Possibly it would be wise not to have a single standard method for all of these purposes. At any rate it would appear to be advisable for the present at least, to employ in water analysis both the 20° and the 37° counts whenever practicable. This will require extra work, but if it is carried on systematically for a year, the data should be sufficient for determining whether the 20° count or the 37° count is most useful, or whether both should be constantly employed. Our laboratory section, through its committees, can confer no more useful service than to undertake such an investigation.

EXPERIENCES WITH STOKES'S BILE MEDIA FOR SENDING CULTURES FROM STOOLS, URINE, BLOOD, ETC., TO LABORATORIES.

J. P. Simonds,
Galveston, Texas.

Read before the Laboratory Section, American Public Health Association, Washington, D. C., September, 1912.

In 1910, Doctors Stokes and Stoner described an outfit for sending cultures from feces, urine, blood, etc., to laboratories to be examined for typhoid bacilli. The outfit consisted of a tube of sterile bile, a sterile swab, a small tin box containing cover slips for blood for the Widal reaction, all enclosed in a regulation double mailing case. During the past summer we used a similar outfit at the bacteriologic Laboratory of the Indiana State Board of Health.

The report of our summer's work does not pretend to add anything new or original to the bacteriology of typhoid fever or the infections of the gastro-intestinal tract. It is presented merely in the hope that it will call further attention to a very useful method—a method which will increase in usefulness now that the study of the epidemiology of typhoid fever in rural districts and the search for typhoid carriers have assumed such importance.

Ninety specimens of feces and one sample of blood were examined. Dilutions of cultures from stools were plated on Endo's medium as soon as received. The specimens of blood were first incubated for twenty-four hours and then plated in the same way. After twenty-four hours' growth colorless colonies were fished from the Endo plates and inoculated into plain broth. After twelve to twenty-four hours' incubation these broth cultures were tested for motility and smears stained by Gram's method. The pure cultures of motile organisms were reserved for the further study except in cases of suspected dysentery when all the non-motile and some of the motile ones were set aside. Sub-cultures of these reserved organisms were made in milk, Dunham's peptone solution, gelatine, and Hiss's semi-solid tube medium containing litmus and dextrose, lactose, saccharose and mannit, respectively. At the same time or later an agglutination test was made with a 1 to 10,000 dilution of a known typhoid immune serum having a titer of 1 to 100,000.

Of the 90 specimens of feces received, 78 were examined for typhoid and 12 for dysentery bacilli. Of the 78 cultures, 13 yielded typhoid bacilli identified by the agglutination test and 6 contained organisms identical in morphology and cultural characteristics with paratyphoid bacillus B. Only one of these 13 cases gave a positive Widal test before the culture from the stool proved positive. Three of the 13 typhoid stools were from 2 carriers one of whom was the source of an epidemic of 7 cases with one death.

Of the specimens taken during the course of the disease, a larger proportion of those taken in the third and fourth weeks showed typhoid bacilli than at any other time. There were 4 positives out of 10 cultures in the third week and 2 positives in 7 cultures in the fourth.

One sample of blood taken on the eighth day and sent to the Laboratory in one of these outfits contained typhoid bacilli although a sample of the patient's stool obtained on the same day proved negative.

Of 12 cultures from cases of diarrhea in children, 4 contained organisms with the morphology and the cultural characteristics of B. dysenteriæ, 3 being of the mannit fermenting type and 1 of the mannit non-fermenting type. B. aërogenes capsulatus was isolated from 2 of the 12 stools. From one of these 2 other organisms were obtained, one resembling paratyphoid bacillus B. the other was morphologically and culturally identical with Morgan's Bacillus No. 1.

In our experience this outfit has proven very useful. While it may often furnish assistance in the diagnosis of typhoid fever, its greatest value is that it furnishes a method of searching for carriers in localities distant from the laboratory thus making it possible to trace epidemics of typhoid fever to their ultimate source, namely an individual who discharges typhoid bacilli in his stools or urine.

TOXICITY STUDIES WITH COAL TAR DISINFECTANTS.

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Read before the Laboratory Section, American Public Health Association, Washington, D, C., September, 1912.

For years the general American public have been receiving a more or less superficial education in matters relating to hygiene, particularly as related to infectious processes and the destruction of germ laden material either by the use of heat or more commonly by the use of disinfecting solutions. As a result of such teaching, as well as by superficial experience in preventing infection, the lay public have become such general users of germicides that no family medicine shelf is complete without one or more substances belonging to this class of medicinal agents. Their use has been carried over also, from the destruction of bacteria to the destruction of grosser parasites, as fleas, lice and ticks, especially as they occur in domestic animals.

Thus it has come about at first upon the suggestion and under the direction of a physician and later through popular education that disinfectant solutions are to be found everywhere while familiarity has bred such a contempt for their usual poisonous qualities that few or no precautions are taken to guard against accidental or suicidal poisoning. This is particularly true in the case of the universally popular carbolic acid whether it be used in the form of pure phenol or as crude carbolic acid. Both have always been so easily obtainable and so carelessly handled that phenol probably outranks all other poisons combined in the number of cases of poisoning and death which have resulted from its use. It was largely on this account that attention was turned from the use of phenol as a disinfectant to its higher homologues, notably the cresols, the advantages claimed being that they were less toxic and even "safe" while at the same time they were more effective as germicides. Lysol introduced in 1898 was one of the first of a number of similar compounds of this type and although these were reputed safe many cases of poisoning resulted and these safe disinfectants were found to be almost if not equally as dangerous as phenol itself.

This use of the homologues of phenol later paved the way for the introduction of a large number of disinfecting solutions, closely allied to the phenol group, the so-called phenoloids which occur as condensation products in the manufacture of coal gas and coke. Recently solutions of these, which are said to be free from phenol and the cresols, have come into great prominence as disinfectants and the market is now flooded with preparations which belong to this class of compounds. As in the case of the saponified cresols it is claimed that these preparations too, give a maximal germicidal effect with a minimal toxic action. Interested individuals even go so far as to claim that they are not poisonous but in this connection it might be well to recall the order of the British Privy Council which permits the unrestricted sale only of liquids containing less than 3 per cent. phenol or its homologues on the ground that in such dilution only is the liquid not poisonous. An extended study of the toxicity of the phenoloid disinfectants does not seem to have been made, however, and in view of the assertions that these higher phenol compounds were less toxic than phenol or, as exemplified in the advertising literature of certain firms exploiting disinfectants of this class, not poisonous, it seemed that experimental study might yield toxicological results of importance.

Certain isolated experiments with coal tar disinfectants indicated that at least some of them were sufficiently toxic to kill cats, guinea pigs and mice when given by the stomach, by subcutaneous injection and intraperitoneally. Their toxicity, however, when compared with that of pure phenol was found to be generally less, but in no case sufficiently less to even suggest that the term non-toxic could be correctly applied to them. In these preliminary experiments it was noted that the toxicity of different disinfectant solutions varied widely and in order to make a comprehensive study of toxicity a large number of the commercial coal tar disinfectants were secured from various sources. Most of the experiments were carried out on mice using from 2½ per cent. solutions or emulsions to 20 per cent., the dilution depending on the toxicity as determined by preliminary tests with a 10 per cent. dilution.

The avenue by which the disinfectant should be given was considered particularly important as the practical value of toxicity studies on animals depends on their applicability to man. At first it seemed that the method of introduction through a stomach tube in cats or dogs would give the most valuable results from a practical standpoint as poisoning in man whether accidental or suicidal is usually from the stomach. Experimentally, however, this method of giving drugs is far from perfect where quantitative results are desired, since vomiting is a frequent symptom in the animals most available for experimental purposes, thus making it difficult to determine accurately the least fatal dose. Further, also, even when vomiting does not occur the results are complicated by the varying degrees of shock which follow the introduction of an irritant or corrosive poison. The subcutaneous method was adopted after a comparison with the results obtained in parallel experiments using both methods. It was found that the initial poisonous symptoms on the part of the central nervous system appeared about equally soon whether the disinfectant were given by the stomach or subcutaneously. Finally the least fatal dose as determined in a number of preliminary parallel experiments is approximately the same.

Tests were carried out on cats, guinea pigs and mice, but mice were finally chosen for the quantitative toxicity experiments and the solution was given by hypodermic injection.

In general, the symptoms of poisoning were the same for all animals and without reference to the disinfectant used. The symptoms resemble those occurring after poisoning with phenol, but present some points of dissimilarity in that the symptoms from the phenoloid group are slower to appear. This indicates somewhat slower absorption, a difference which is more apparent on subcutaneous injection than when given by the stomach. The typical tremors of phenol poisoning are invariably present but are never so marked either in degree or duration and the animal dies during the succeeding paralytic stage, whereas, with phenol, convulsions often immediately precede death. The autopsies of animals dying as a result of the subcutaneous injection show no typical lesions, but it is noted in animals that recover that ulcers frequently develop at the site of the injection showing that destruction of tissue has taken place. In cats which have received a solution of the disinfectant by the stomach there are frequently evidences of extensive destruction of the gastric mucosa.

Thus it is seen that the coal tar disinfectants are toxic just as phenol is toxic. Any difference is largely a matter of degree and in order to secure a basis for estimating this the toxicity of all the disinfectants experimented with was compared with that of pure phenol given under similar conditions.

Only one disinfectant solution, a sample of tricresol, among the eighty studied was found which was practically as poisonous as phenol. Thus it was found that mice of 20 grams weight were killed as a rule by 0.9 cc. of a 1 per cent. solution of phenol. Tricresol was lethal in a dose of 1 cc. of a 1 per cent. solution. Four other disinfectants of the series were so actively poisonous that 0.8 cc. of a 2 per cent. solution was fatal and these in turn were more poisonous than Lysol which has held such an important place in the list of deaths from poisons. Lysol is poisonous when given in a dose two and one-half times that of phenol. In general, however, the toxicity of the commercial disinfectants is somewhat less than the above, the average having a toxicity about one fifth to one sixth that of phenol while a number are still less toxic the least toxic being about as poisonous as phenol in 4 per cent. solution.

These results were not entirely a surprise in spite of the claims of a large number of manufacturers to the contrary, for it seemed unlikely that compounds so closely related to a very toxic substance like phenol should prove non-poisonous. Among the first fifty disinfectants examined nineteen are labeled non-poisonous, safe, a harmless substitute for carbolic acid, safe in the hands of the most timid, etc. Another, tricresol, is labeled one third as toxic as phenol. Tricresol is practically as poisonous as phenol and this agrees with the results of Tollens who worked with the isomers ortho, meta and para cresol. With regard to the nineteen so-called non-poisonous disinfectants much less credit can be given to the firms who are responsible for the obviously misleading statements appearing on their labels—for at least half are decidedly toxic and all are more toxic than the 3 per cent. phenol allowed by the British Privy Council.

The ratio of toxicity and the phenol coefficient as determined by the Hygienic Laboratory method do not run parallel although there is a very general relation. Thus the disinfectants with a high phenol coefficient were usually very toxic while those with a very low coefficient were usually only mildly poisonous.

In conclusion, it may be said that the coal tar disinfectants of the phenoloid group are considerably less toxic than either phenol or the cresols, but they are not harmless non-poisonous substances and on an average have a toxicity equal to about 20 per cent. phenol. Manufacturers and retailers accordingly should be required to revise present labels and to designate such products as toxic by the use of suitable poison labels. Until this is done physicians and health officials who recommend disinfection should warn the general public of the danger of such solutions and urge upon it greater care in storage than is now common practice.

A PLAGUE-LIKE ORGANISM FROM A RAT.

Read before the Laboratory Section, American Public Health Association, Washington, D. C., September, 1912.

Surgeon John F. Anderson, *Director Hygienic Laboratory*
and
P. A. Surgeon Allan J. McLaughlin, *U. S. Public Health Service.*

The proximity of plague to our Atlantic seaboard makes it essential to determine whether plague infection exists among the rodent population in our seaports.

The examination of rats found dead, trapped or poisoned is not a simple procedure, and the diagnosis of plague in rats requires some little care in excluding other organisms. Some of these organisms may produce lesions in rats very much like plague, and may resemble B. pestis morphologically. It is especially necessary that care be taken to exclude suspicious organisms in cities where plague infection has not existed before. A false diagnosis causes unnecessary alarm, and great damage to commercial interests may ensue.

There are certain diagnostic lesions which are looked for in rats dead of plague, such as the dusky injection of the skin, the characteristic buboes, the granular liver, the large dark spleen and pleural effusion.

It is probable that these five cardinal lesions would never be found co-existent in any infection other than plague. Some of them are found, however, in animals dead of other infections, and as we find animals dead of plague with two or three of the typical signs absent, confusion may readily occur from gross post-mortem findings alone. Some of these organisms show a morphology not unlike plague, and while one would not base opinion on morphology alone, the presence of bipolar-staining bacilli in a smear from spleen or liver is suggestive of plague to say the least.

In view of these facts it seems pertinent to report an investigation of a suspected plague rat made by one of us at Key West, Fla. Doctor Anderson's report is as follows:

"Upon my arrival in Key West I at once called upon Dr. R. L. Benson, bacteriologist of the State Board of Health of Florida, who was in charge of the State Health Laboratory in Key West. Doctor Benson gave me the following history of the rat:

"The rat was caught on July 22 at a house situated on White Street, between Petrona and Olivia streets, this location being somewhat remote from the docks. The rat was noticed to be slowly crawling across the floor of the dwelling and was kicked and killed by a boy residing therein.

It was brought immediately to the laboratory and the following is from Doctor Benson's notes:

"*Autopsy.*—Hair almost entirely gone. Upon reflecting the skin over the chest and abdomen no subcutaneous injection; slight injection and enlargement of the inguinal glands on both sides; lymph glands in other portions of the body apparently normal; lungs apparently normal except for a nodule in the right lung which contained a mucoid-like material; small amount of yellowish fluid in the pleural cavity. Liver showed fine yellowish spots quite numerous, and in addition several yellowish areas. Spleen dark and slightly enlarged.

"Cultures made from the lung nodule, liver and spleen showed a cocco-bacillus apparently in pure culture. No direct guinea pig inoculations were made. A guinea pig was inoculated July 26 by the cutaneous method from culture made from the suspected rat, and died July 29; at autopsy under surface of skin was found to be slightly reddened but no general injection; inguinal glands slightly enlarged and hyperemic, other glands apparently normal; liver yellowish, the left margin of inferior surface showed an oval yellowish area; the anterior surface showed yellowish spots about the size of a pea; the left lobe of the liver was thickly studded with pinhead-size yellowish spots; spleen very dark but not enlarged.

"Cultures made from the spleen and liver on agar showed the same bipolar staining cocco-bacillus that was noticed in the smears made from the suspected rat.

"In addition to the inoculation of this guinea pig Doctor Benson inoculated other animals from the first guinea pig and had, on my arrival, obtained the organism in pure culture.

"Immediately upon my arrival, cultures were made upon glucose-broth, lactose-broth, salt-agar, and neutral agar.

"Guinea pigs and white rats were inoculated, some subcutaneously and some cutaneously. Some of the animals, in addition, received antiplague serum. In twenty-four hours examination of the cultures showed the absence of involution forms upon salt-agar; profuse and heavy growth upon salt-agar and neutral agar, the formation of gas with acidity in glucose-broth; a growth in lactose-broth without change in reaction.

"A guinea pig inoculated subcutaneously, and which had not received any antiplague serum, showed distinct evidence of illness within eighteen hours after inoculation and died in about twenty-eight hours after inoculation. At post mortem the findings were in no way typical of plague.

"The white rat inoculated with a subcutaneous injection and which had also received antiplague serum, died in about thirty-six hours after inoculation—some hours before the control animal which had received no antiplague serum.

"Based on the above findings, the opinion was arrived at that the organism isolated from the suspected rat was not the plague bacillus."

Doctor Anderson was able to exclude plague quickly by the use of glucose-broth and salt-agar. Upon his return to the laboratory Doctor Anderson gave me a culture of the organism, and I have been able to confirm his findings.

The organism is an actively motile rod with a tendency to bipolar-staining. It produces gas and acid in glucose, but neither acid nor gas in lactose, which places it in the B. Enteritidis (Gärtner) group. Its action on various media is identical with B. Enteritidis (Gärtner). It gave no involution forms but grew luxuriantly on salt-agar.

To identify or separate this organism from Paratyphoid B., and B. Enteritidis (Gärtner) would require the preparation of sera for cross agglutination and the Castellani saturation experiment, procedures which were not possible for lack of time.

THE LIMITATIONS OF THE PHENOL COEFFICIENT IN THE STANDARDIZATION OF DISINFECTANTS.

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Read before the Laboratory Section, American Public Health Association, Washington, D. C.
September, 1912.

A disinfectant may be tested by the determination either of its absolute germicidal effectiveness under stated conditions, or of its relative effectiveness with respect to some other disinfectant. The one method gives its absolute germicidal power, the other its relative power or germicidal coefficient with respect to the other disinfectant. The phenol or carbolic coefficient, due to Rideal and Walker is the best known example of the latter method and the term standardization of disinfectants has come to mean the comparison of the strength of any disinfectant with that of phenol under certain standard conditions.

If such phenol coefficients exist, their determination, for a series of disinfectants, would be of greatest commercial and economic value. Unfortunately there is abundant evidence that no such constant relation between the efficiencies of any two disinfectants is determinable. The absolute germicidal power of a diluted disinfectant depends, for example, upon the concentration, that is, the amount of disinfectant in the solution, but it is seldom directly proportional to the concentration. The efficiency of one germicide may vary directly as the concentration of another as the sixth power of the concentration. Obviously then, there can exist no "coefficient" which will state the relative values of these two. Doubling the amount of the disinfectant will double the efficiency of the one and increase that of the other by 64 changing the ratio or coefficient 32-fold. This, it is true, is an exceptional case in that disinfectants of widely differing types are represented—mercuric chloride and phenol—but that such extreme discrepancies are not noted in every-day practice is due wholly to the fact that our investigations are concerned largely with coal tar distillates of very similar chemical properties.

There are numerous other factors, such as temperature, time of contact, etc., which affect the actual germicidal powers of any two disinfectants disproportionately. Consequently if these be varied, the "coefficient" or relative value necessarily varies. The effect of concentration cited will serve as an example of the indeterminate character of the phenol coefficient or of any other similar ratio. In general, the germicidal powers of two disinfectants, although affected by varying physical conditions, are not similarly affected, so that varying conditions give a varying ratio of these two germicidal powers, or, in other words, a varying coefficient.

It is interesting now to see what cognizance is taken of these matters in the Rideal-Walker coefficient as determined by the various methods that have been proposed. The first essential in a "coefficient" is that it shall be constant for a given pair of disinfectants, and the fact that the ratio between the efficiencies of two germicides under varying degrees of concentration, temperature, etc., necessarily varies, might appear to be a serious bar to the determination of such a coefficient. Such was found to be the case and it has become necessary to limit these physical conditions one by one as each new variable has asserted itself. The latest result is the most excellent technique recently reported by Anderson and McClintock. This leaves little to be desired in the matter of refinement and control, and if phenol coefficients are to be determined, one most heartily endorses some such method. All variables are carefully eliminated even down to the test organism,—not only the kind of organism but the lineage of the strain being specified.

But suppose, in actual practice, germicides should be used on ordinary typhoid germs, not of the Hopkins ancestry, or even upon tubercle bacilli, on car floors. In general, suppose the practical conditions are in any way or in many ways unlike those under which the test is made. In attempting to fix the non-existent "phenol coefficient" by the successive elimination of variables, have we not lost sight of the primary reason for all this work, the valuation of disinfectants?

For answer let us define a phenol coefficient. In their excellent paper upon the Standardization of Disinfectants,[1] Anderson and McClintic do not define the coefficient in so many words, but in their discussion of cost and valuation, it is implied that a disinfectant with a coefficient of two is twice as valuable as phenol, i. e. may properly command twice the price. Conversely, at the same price, the cost of the disinfectant per unit of efficiency is one half that of phenol. One is justified then in regarding the Hygienic Laboratory phenol coefficient as the relative efficiency of the disinfectant in question compared with phenol. The same definition might apply equally well to the Rideal coefficient, yet the two coefficients may vary widely. Is this then a fair definition of the result of the specific test by which the coefficient was determined? Obviously it is not. A coefficient must bear all the restrictions that have been imposed. Under the exact conditions prescribed, starting with the Hopkins typhoid cultures 24 hours old, in extract broth, previously transplanted on three successive days by carrying over each day one loopful of a 4 mm. platinum loop to the final observation of the weakest dilutions which kill in 2½ and fifteen minutes respectively; every move is carefully planned to protect the test against just those variables that ought to be encountered and determined.

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[1] Pub. Health and Marine Hospital Service Hyg. Lab., Bull. 82, 1912.

A coefficient is eventually obtained and with sufficient care may be duplicated, even by other workers, but the manner of its birth must not be forgotten. It is not the relative efficiency in general terms. It is the relative efficiency under one of the thousands of possible combinations of all the variables, namely, the particular conditions imposed by the technique of the test. With other techniques, equally worthy of adoption, widely differing values would result, all having equal claim to recognition.

Surely no fundamental significance can attach to these phenol coefficients when an entirely new series of values would result from the adoption of:

(a) Another strain of typhoid organism or even the same strain grown under other conditions;

(b) The use of more or less of the culture in the test, or its equivalent, the use of a culture not twenty-four hours old;

(c) The adoption of another standard time for the duration of the test.

Anderson and McClintic give an interesting example of the last named point. They determined coefficients at 2½ and 15 minutes. The latter is at times twice the former; in one quarter of the cases it is over 50 per cent. greater; and in all the 81 cases it averages 32 per cent. greater. By the Hygienic Laboratory coefficients, with organic matter, trikresol (2.50) is more efficient than sulpho-naphthol (2.33) in the ratio of 1.07; with the three minute coefficient the ratio becomes 1.25, while with the 15 minute coefficient, the superiority is reversed in favor of sulpho-naphthol in the ratio 1.11; a total difference of 36 per cent. in the comparative valuation of these two disinfectants. One of the most powerful disinfectants reported gave a value of 7.50 at 2½ minutes and 12.22 at 15 minutes. Manufacturers might seriously and very properly object to the arbitrary selection of any particular time factor under these circumstances.

The authors themselves show that a variation of 33 per cent. is possible if the selection of the time factor be left to the bias of the operator. No good reason, however, appears for the arbitrary selection of any standard time of testing and the recorded facts show clearly that the resulting coefficient is quite dependent upon the particular time selected. With some disinfectants, the influence of time is slight or nil, with others it is great. Hence varying times affect the final coefficient of two disinfectants differently, and one or the other may have the greater "phenol coefficient" according to the time actually adopted as standard.

Unfortunately the conditions of practice may be quite remote from the standard conditions of the test and the true relative values under the natural conditions of use may be equally remote from the phenol coefficient as determined. In the cases just illustrated, one would ordinarily give more weight to the 15 minute coefficient than to the $2\frac{1}{2}$ minute value or to the average.

The limitation of the phenol coefficient is nowhere more plainly shown than where it is applied in practice. The most obvious application of a coefficient lies in determining relative costs of disinfectants. At the same price per gallon, a disinfectant with a coefficient of two costs half as much per unit of disinfecting power as phenol or another disinfectant, having a coefficient of one. If the coefficient be two, under specific conditions of concentration, temperature, time of contact, etc., and may become one under other specific conditions, then relative costs vary to the same extent. If the coefficient be two for typhoid bacilli, it may be only one for pus organism; a second disinfectant may have a reverse relationship. Grave injustice would be done by assigning costs to these two based on typhoid tests if in practice the cocci were the organisms to be destroyed.

Whatever then may be our attitude on the value of testing disinfectants, one must strongly protest against the application of this highly specialized "coefficient" for the determination of the cost of disinfectants per unit of disinfecting power, that is, their valuation.

The carbolic coefficient of Rideal with its varied modifications is now so well known and so generally used, and represents such an important step foreward, that one might hesitate to oppose its use in the absence of any alternative.

The writer has published elsewhere[1] a contribution to this subject in which the more fundamental theoretical and bio-chemical aspects of the problem are discussed. Instead of eliminating variables, the more important of them which had any theoretical basis were included in the study. As a result, three factors were evolved which relate to the absolute, not relative, efficiency of the germicide under a wide range of conditions.

These covered the more important physical and chemical conditions of practice and by them a given disinfectant is rather fully defined as to its action under all variations in these conditions. This study is a part of a purely theoretical investigation in chemical biology and its application to the practical problem of testing disinfectants is only incidental. The certainty with which it demonstrated the non-existence of a single phenol coefficient (as well as of a thermal death point and many other sacred concepts of bacteriology) seemed to justify an attempt to apply it to this problem. It is difficult to understand in principle and requires further development in technique. Giving three or more final terms of comparison, it does not permit generalized cost efficiency calculations or even facilitate comparative valuation of two disinfectants. On the other hand for known conditions of practical application these three or more factors indicate clearly the relative efficiencies of a series of disinfectants.

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[1] Journ. Inf. Dis. 8, 1911, 27.

In conclusion the writer wishes to express his great admiration of and respect for the work of Rideal and Walker, Anderson and McClintic and others in this field. They have gradually brought the technique of this difficult test to a high degree of perfection. Until the refinement of practice necessitates a more complete and less arbitrary method of comparison the phenol coefficient will undoubtedly be widely used. With a full knowledge of its limitations and of the fundamental facts which underlie them, it can be used to much good purpose. It is only with an earnest desire to place these limitations upon the record that this contribution to an important subject is submitted.

Sanitary Research Laboratory. Mass. Inst. Tech.

THE COMMON HOUSE ROACH AS A CARRIER OF DISEASE.*

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Read before the Laboratory Section American Public Health Association, Washington, D. C., September, 1912.

During the past six summers, when a little time could be stolen from the routine service, a number of experiments were made with the common house roach, as one of the insecta class belonging to the phylum arthropoda, the six-legged type of house insects.

As these common house roaches feed upon all kinds of bread stuffs, milk and its products, water, clothing, cooked foods, migrate from one apartment to another following water and drain pipes, from cellar to living rooms, intermingle with others of their own and other types of insects, I selected these for the few limited experiments, of which I make a preliminary report.

Limited time will only admit of the most brief mention of the findings from these studies, all technic and details must be excluded, the actual results only recorded. Among the first experiments made with the common house roaches, was the placing of four in different sterilized flasks, allowed to remain for forty-eight hours, then removed, and nutrient bouillon run in, incubated.

The resulting growth plated out on different media, resulted in the demonstration of the B. coli communis, B. proteus vulgaris, staphylococcus aureus and citreus and a bacillus of the subtilis type.

This indicated that the roaches carry infection on their legs and feet, and the problem of what their feces contained was next considered, and ten roaches secured, the legs of five removed, dropped in nutrient bouillon, the flasks numbered, and each roach dipped in bichloride solution, dried in sterilized flasks, the body opened, and with the platinum needle loaded with the visceral contents, flasks of bouillon were inoculated, numbered, so that each set of legs and its body, could be investigated.

The same general type of bacteria was developed, isolated and identified in the plates of both the legs and visceral contents of each roach, but in the visceral content of roach number 4, a streptococcus was isolated, that hemolyzed human blood, thus proving its virulency.

These results indicated that the bacterial content on the feet was the same as in the feces, and to ascertain if the roaches devour the feces of one another if starved, the following experiment was tried.

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*From the Toledo Clinical Laboratories.

Ten roaches secured, kept in sterilized flasks, and at end of the third day, five were fed upon few drops of a bouillon culture of B. typhosus, then placed in setrilized flasks for three days.

Meantime, the flasks of the other five roaches were washed with bouillon, and plates gave no cultures of B. typhosus.

The control roaches were placed in the five flasks that had contained the five roaches fed upon the bouillon, with no food, and allowed to remain for three days, their feet and visceral contents of each roach on plates gave the B. typhosus with other ordinary bacteria previously found.

This experiment proved that the roaches when starved, or not starved, will feed upon the feces of their own type of insects and not unlikely, of all other types met with in their migration from one locality to another.

To ascertain further, the possibilities of infection carried by the house roaches, ten roaches were secured, five were kept as controls, all secured from one source and pantry. Five roaches in different sterilized flasks were fed upon coagulated, sterilized egg albumin, inoculated with a Wesbrook's type of B. Klebs-Loffler, sent me few years ago by Dr. William Royal Stokes, from his laboratory cultures. From the legs and each of these five roaches fed on the inoculated egg albumin, the Wesbrook's type of diphtheria bacilli were recovered, and from the five control roaches, no bacteria of the diphtheritic type were demonstrated.

In like manner, five roaches and five control roaches were fed upon sterilized bread, inoculated with streptococcus pyogenes longus, and this type of streptococcus recovered from the legs and visceral content of each roach.

That the virulency of the streptococcus was not diminished by its passage through the roaches was proved by the hemolysis of the culture before being fed to the roaches and the recovered strain was unattenuated.

Chromogenic bacteria were next tried, the prodigiosus, the violaceus, the pyocyaneus, the controls free from these bacteria, and the inoculated roaches demonstrating these individual bacteria from both the feet and visceral contents, associated with other ordinary bacteria.

More difficult were the experiments with the pneumococcus, but small bits of a blood agar culture were exposed to ten roaches, whose previous cultures from feet and feces were negative to the pneumococcus.

Sterilized camel's hair brushes, dipped in warm, sterile water, washing off the feet and abdomen of each roach, streaking the surface of plates, the media being sheep serum, human blood with 1 per cent. glucose, coagulated, sterilized by lower temperature for longer period.

Of the ten plates inoculated, but three demonstrated pneumococcus colonies, with the other ordinary bacteria. The bodies of the ten roaches after being opened up and smeared along the surface of similar plates, resulted in from few to a number of pneumococcus colonies from each body.

Similar experiments were tried with the meningococcus, but while few plates demonstrated a colony now and then, the results were not as decided as with the pneumococcus, probably due to the meningococcus being so easily killed and the body warmth of the roach less than required to grow this type of bacteria.

I have not had the time nor opportunity to investigate the possibility of other pathologic bacteria, but have proven that the common house roach does and can carry all of the common pathologic bacteria of the acute infectious diseases, as well as any bacteria that can be met with in the roach's travel, and any bacteria that can survive the environments of the roach's diet and habits.

These house roaches, or any of their type of wandering insects, living as they must on what they find, feeding upon all kinds of food, depositing their feces along the route, gathering up all kinds of bacteria on their feet, feeding as is shown on the feces of their type and others, become laden with all types of pathologic bacteria.

All the bread stuffs, milk and its products, cooked foods in open dishes, in cellars, pantries, shelves, kitchens, are open to these wandering roaches, which passing over the foods, leave deposits from their feet and feces, bring direct to the consumer, any or all pathologic bacteria that a roach may encounter in his journey.

The temperature of the months that render the roaches active, is also favorable to the growth on some cooked foods, milk or vegetables that are eaten raw, of any or all bacteria deposited.

Those vegetables, foods, meats that are cooked, just before eating are harmless because of the sterilization during cooking, but especially are the dangers of these roaches about the restaurants and hotels, which are never without them the year round.

I have never had the opportunity to investigate the roach and some parasites, which is an unknown question, as regards some of the pathologic types and may not be a source of danger.

This brings up an important matter as to the transmission of B. tubercle, from sputa deposited in damp, dark places in cellars, kitchens and restaurants, more than in private residences.

Such transmission of B. tubercle, taken up from sputum, deposited by both the feet and feces of the roach on certain cooked foods, which are eaten without again being heated, as so often occurs in the summer months is entirely within range of possibility. It seems a question of whether the roach will feed upon the sputum, may not unless starved, yet may live upon the sputum, wherever found in its wanderings. Whether the environment of the roach's viscera is favorable to the living B. tubercle, I am not able to say, but might be worth investigation. The common house fly, loaded with all kinds of bacteria, benign and pathologic, coming in from the street dirt and manure, to sit on and walk over our food stuffs, water pitchers or sugar bowls, offer no more danger from acute infectious diseases than does the common house roach, running over our foods, vegetables, breads, cakes and water utensils, and should be as thoroughly exterminated as the mosquito.

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THE BACTERIOLOGICAL EXAMINATION OF FOODS WITH SPECIAL REFERENCE TO GELATINE.

S. C. Prescott and C. A. Magoon.

Read before the Laboratory Section, American Public Health Association, Washington, D. C., September, 1912.

The examination of food substances may be carried on from two standpoints, first, to determine if adulteration has been effected, or if the food presents a normal tissue or cellular appearance and the proper percentage of the ingredients entering into its composition; second, to determine if it is in a condition such that it is wholesome, undecomposed, and free from organisms which may either be harmful in themselves or may cause putrefactive or fermentative change of such a nature as to impair the food value of the substance if development takes place.

Chemical and microscopical methods of examining foods for adulterating substances and for normal appearance have been in use for many years and have reached a high degree of accuracy in many instances. Unless decomposition is well advanced, however, chemical examination fails to reveal the changes induced by microörganisms and hence this method of investigation fails to be of great service in determining the early stage of putrefactive or fermentative decomposition.

For many food substances bacteriological examination offers a means of determining the true character of the food with greater certainty than does the chemical analysis. For example, chemical analysis will show if a sample of milk or butter contains the legal requirements of fat, or an excess of water or the presence of preservatives. It fails, however, to indicate the presence of undesirable types of bacteria, knowledge of which is of far greater importance from the standpoint of health than is the percentage of fat, and the finding of which in large numbers is in itself evidence of the absence or negative action of preservatives. While fully recognizing that the chemical methods of food examination are most necessary and always desirable, we wish to point out that bacteriology may supplement chemistry in a most useful way, and may frequently supply the chief really important facts relative to the fitness of substances for foods, as, for example, the bacteriological examination of oysters. Likewise, valuable results may be obtained in the examination of sausage, cheese, canned goods, meats, and many other food substances in which it is suspected that undesirable changes are being effected, providing knowledge of the normal condition of these foods is available as a sort of a base line for comparison, from which reasonable and safe deductions may be made. In canned goods, for example, the mere presence of bacteria is indicative of imperfect preparation and sterilization.

Among the substances used for food, in which bacteriological examination is of importance, gelatine occupies at present a conspicuous position. Although actually low in nutritive value, this substance, by much advertising and because of its adaptability to various culinary uses, has advanced from a mild adhesive and now occupies a position as a commodity in very general use. Notwithstanding this, or rather because of this widespread use, its manufacture from bones, pieces of skin, trimmings from hides, etc., makes it of special importance that we may be certain that objectionable organisms associated with the animal body, such as B. tetanus, B. coli, etc., are eliminated. Bacteriological examination of gelatine therefore becomes a necessity to the manufacturer, who wishes to maintain a high grade product, and to the food inspector whose duty it is to safeguard the public. Owing to the ease with which many bacteria decompose gelatine, it is also of importance to the manufacturer to know whether his product will stand intact under all conditions met in commercial practice.

The bacteriological examination therefore may be carried out from two apparent standpoints. First, the health standpoint; second, the commercial standpoint. In reality the aim in both cases is the same, namely, to determine if the gelatine is low in numbers and free from objectionable types of bacteria.

Owing to the prevailing methods of gelatine manufacture,—methods which are in a measure controlled by the physical properties of the product, it is almost or quite impossible to obtain gelatine in a germ-free condition without resorting to the use of strongly germicidal substances. We cannot, therefore, assume that a pure gelatine is one which is germ-free or vice versa, that a germ-free one is necessarily pure.

The Manufacture of Gelatine.

Edible gelatines are made from trimmings from hides, bones, either raw or treated, dentelles, horn piths, etc. In America much of this material is imported and is of such a character that it may be more or less infected with bacteria of various types, including B. tetani.

This material is subjected to a long continued liming treatment after which it is thoroughly washed, the excess of lime removed by acid and again washed. The material is then ready for the boiling kettles where, by treatment with steam, the ossein or collagen is hydrolized into gelatine which is dissolved. Care is taken to avoid excessive or too long continued heat. After the removal of the gelatine thus extracted the process is repeated at a slightly higher temperature. The highest grades of gelatine are the ones best for food purposes and are obtained in the first run or boiling, although gelatine from the second treatment is also used for food purposes. Mixtures of gelatine from different sources are made by some manufacturers in order to obtain a fairly uniform product. The extracted material is then strained and goes at once to the evaporator where it is concentrated under reduced pressure until of approximately 10 to 12 per cent. solution. After thorough mixing and filtration it is cooled either by surrounding by cold water or by refrigeration after which it is cut into sheets and dried.

Possibility of Infection in Process.

The early stages in the preparation of gelatine are essentially germicidal in character. The lime destroys many bacteria resident upon the raw materials and the acid treatment continues their destruction. Survivors of spore-forming types succumb almost completely in the boiling kettle, so that the product at this stage of the process may be regarded as practically sterile. After the concentration, however, infection may take place if the gelatine is subjected to unclean apparatus, dirty methods of handling and contamination from water or air. Thus a dirty unsterile filter may seed the gelatine with bacteria, or the use of distributing pipes not steamed out constantly with live steam may supply the first portion of a batch with innumerable bacteria while the last portion would pass through practically unaffected. Similarly, handling in the cooling and the cutting rooms may add its quota of organisms.

The Effect of Time.

Even in gelatine which has been carefully prepared and reaches the cooling room with a very low bacterial content, or nearly sterile, the process of cooling to the proper solidity is likewise a process of incubation. In passing from the high temperatures to the lower ones the mass of material requires a considerable time so that it may be, and generally is, held for several hours at a temperature favorable for bacterial development. The result is that from this time until the drying has brought the concentration to an inhibitive point the germs are increasing more or less rapidly in the medium, and their number is being augmented by infections from the air and from the hands of workmen. In view of all these possibilities, therefore, it is to be expected that gelatine which is itself so easily utilized as food for microörganisms should contain considerable numbers of bacteria and a more or less varied flora.

Methods of Examination.

In the work which has been used as the basis of this paper both quantitative and qualitative results were obtained. A study of the problems involved led to the conclusion that the most reliable quantitative figures were those obtained by growing on standard agar at 37 degrees C. with an incubation period of two days. Anaërobic methods were found to add nothing of value in this respect. For inspection purposes and to maintain this work in line with that done on other foods, milk, oysters, etc., determinations of the approximate numbers of gas-forming types have also been made, dextrose broth and lactose bile being used for this purpose. For all this work the standard amount of material taken was one cubic centimeter of the melted jelly in the investigation of the different steps of manufacture. In the examination of the finished product results were based on the gram weight of material, but for greater accuracy in work, solutions were made using five-gram samples and dilutions from these prepared. At the outset it will be found that samples even from the same lot or batch will give great variations, hence the necessity for care in sampling and for thorough mixing.

QUANTITATIVE RESULTS.

A large number of determinations of bacteria in different samples of gelatin have been made, the results of which need not now be given in detail. Here it will suffice to show the approximate number of bacteria found at different stages in the manufacturing process:

From the kettles,	10 to 500 per cc.
From the filters,	5 to 50 per cc.
Hose at cooling room,	5 to 100 per cc.
From solidified gelatin,	1000 to 100,000 per cc.
Green sheets after cutting,	2000 to 200,000 per cc.
From dry sheets,	Numbers very variable, depending upon conditions, ranging from a few thousands to many millions in exceptional cases.

GENERAL CONCLUSIONS.

From the standpoint of gas production in lactose bile and dextrose broth it is worthy to note that the fermenting or gas-forming types of organisms are almost always present in small numbers even in the early stages of the process. Compared with the total numbers of bacteria found they are in general very few. Even in the materials directly from the kettles they may be found indicating that they are resistant to heat if not actually spore-forming. The occurrence of these fermenting types suggests the presence of organisms of the colon type, indeed there has been a tendency to call such organisms "colon bacilli" and to regard them as indicative of pollution. On this point we have concentrated a great deal of attention and have come to the conclusion that true colon bacilli, while frequently present, are not *constantly* present in large numbers, at least they do not occupy a more prominent position than some other types. As a result of the detailed study of about seventy-five cultures we have classified the bacteria found in four groups.

Group I. In the first group may be placed organisms giving all the usual colon reactions, showing from 30 to 75 per cent. gas in lactose bile and from 25 to 100 per cent. gas in dextrose broth. Both communior and communis types were isolated and are here grouped together.

Group II. This we regard as the most characteristic group of gas-forming bacteria occurring in gelatin. The organisms of this group grow vigorously on all media, simulate colon bacilli in the growth of agar but liquefy gelatin, fail to reduce nitrates to ammonia and fail to produce indol. The gelatin liquefaction is very rapid, frequently taking place within twenty-four hours, considerable variation is noted in the production of nitrites, motility and growth on potato.

Group III. This group consists of bacilli which liquefy gelatin, form spores, produce no gas in dextrose broth, lactose broth or lactose bile but produce acid in milk, reduce nitrates and give a positive indol test.

Group IV. Here are included all the coccus forms found, for the most part staphylococcus. These produce no gas, but do form indol, reduce nitrates, give acid in milk and generally liquefy gelatin. These are frequently very numerous and may even be the predominate types so far as actual numbers are concerned.

This grouping of the organisms found is subject to revision, and further work is in progress, especially in the hope of clearing up the doubt which may now exist in regard to the gas-forming species.

PATHOLOGICAL DANGERS TO DOMESTIC ANIMALS FROM CONTAMINATED STREAMS.

HORATIO N. PARKER,
University of Illinois.

In gathering data for this paper, 114 letters of inquiry were sent out; 40 state boards of agriculture, 10 agricultural experiment stations, 4 live stock boards, 48 state boards of health, and 12 individuals, who it was believed possessed particular information on the subject, were addressed. The replies came from every state in the Union, and were from 32 state boards of agriculture, 10 agricultural experiment stations, 4 live stock boards, 42 state boards of health, and from 11 of the persons from whom information was sought.

The responses of the state boards of agriculture and of the live stock commissions betoken great interest, but few of these boards have been active in investigating the subject.

Poisoning of animals, supposedly from drinking stagnant water containing hemlock (cicuta), is reported by the Colorado Board of Agriculture.

Outbreaks of anthrax have been traced to streams pollution by investigators in widely separated parts of the country. Ravenel, in the transactions of this Association, p. 303, vol. 24, 1899, gives an interesting account of a series of cases that were caused by the effluent of a Pennsylvania tannery, and he, also, has a report on the subject in the *Philadelphia Medical Journal* of April 22, 1899. The State Board of Agriculture of Delaware states that it is believed the effluents from the morocco factories in Wilmington, Del., and Camden, N. J., were the cause of the prevalence of anthrax on both sides of Delaware River and Bay in Delaware and New Jersey. These eruptions are described by Professor Neale in the Fifth, Sixth, Seventh, Eighth and Ninth Annual Reports of the Delaware College Agricultural Experiment Station, 1892–1897. According to these reports some of the outbreaks were caused by the floating ashore of disease virus, presumably from the carcasses of animals that were thrown into the river. Russell, in the Seventeenth Annual Report of the Wisconsin Experiment Station, pp. 171–184, 1900, describes an outbreak of anthrax that occurred in the vicinity of Medford, Wis., and was limited to the banks of Black River. The virus of the disease undoubtedly came from tannery refuse and was probably due to the use of infected hides from China.

Moore, in *Bulletin 141*, Nov. 1897, of the Cornell University Agricultural Experiment Station, describes a disease that occurs amongst swill-fed hogs, is similar to hog cholera and is caused by the free alkali, sodium carbonate, contained in some powdered soaps. Ravenel, by letter, states that he has seen an instance of the same thing, where the waste from a hotel caused the disease, but that the case was never published as it was not fully worked out.

Wastes, incident to mining, by many state boards of agriculture are reported to be harmful. The Montana Board writes that in Deer Lodge and Silver Bow counties smelter slums, in numerous instances, have killed both cattle and horses. Conditions in these counties are described by Salmon.[1]

The Arizona Agricultural Experiment Station, on p. 497 of its Fifteenth Annual Report, 1904, details the killing of cattle near Cochise, Ariz., by lead poisoning. The animals drank from the tailings pond of a quartz stamp mill.

The New Mexico Agricultural Experiment Station reports the poisoning of cattle by lead and arsenic from the effluent of the concentrator of a lead mine near Las Cruces.

The South Carolina Board of Agriculture states that the effluent from the chlorination plant of the Hale Gold Mine did so much injury to cattle that the mine was closed down by injunction suits brought against it.

The Washington Agricultural Experiment Station says that the only record of even alleged injury to cattle would be in the suits for damages from the tailings of the Coeur D'Alene lead mine, but doubts if the records are available for public consultation.

The Department of Agriculture of Alabama, through the state veterinarian, Dr. C. A. Cary, reports that complaints are received that the wastes from mines and factories contaminate creeks into which they flow and injure cattle that drink these waters. The accusations have never been investigated.

As a whole, the replies of the state boards of health indicate that these bodies have not been active in investigating the effect of streams pollution on the health of domestic animals. Undoubtedly, in many states, the live stock industry is not large, and more pressing problems than this engage the attention of the boards. Some boards indicate that they consider the question important, and that they are planning to investigate it in the near future. Other boards lack the power to do so. This appears to be the case in Tennessee; in Maine where the state board of health has not been entrusted with control of the water supplies, and in Minnesota. Of the last named state, Doctor Bracken says that the state board of health has control of waters used for domestic purposes but that, though the question has often been raised as to what "domestic" means, no authoritative legal interpretation has been given it. The doctor is inclined to believe that the courts would not hold that "domestic" use means use for domestic animals. He says that he has always considered a polluted stream as unfit for domestic animals to drink, and that farmers have a case at law against parties polluting such a stream.

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[1] Am. Veterinary Review, Vol. 39, Nos. 1, 3 & 5, 1911; Vol. 40, Nos. 2, 1911, 5 & 6, 1912; Vol. 41, Nos. 2, 3 & 4, 1912.

This is the belief of John W. Hill, who writes that it is his opinion that the farmer owning land bordering a stream, under his riparian rights, is entitled to receive the water on his land in its best natural condition; that is to say, that in the development of towns and cities the settlers have no right to impair the quality of a stream of water to the detriment of the farmers.

Prof. C. N. Kinney, state chemist of Iowa, has been called in a number of damage suits occasioned by the pollution of streams by towns and corporations. In a letter he says that the evidence in these cases tends to show that the effect of polluted water is especially marked on the health of cattle; the creatures become thin and scrawny, and seem to lose appetite rapidly, and the young stock seems not to grow as it should. He mentions a suit against Grinnell, Iowa, for polluting a stream and injuring cattle thereby.

The State Board of Health of Louisiana says that the streams in that state are so large, and the amount of pollution so small, that the problem is not pressing; while the Oregon Board is of the opinion that it will be fifty years before the question becomes important in Oregon.

In Kansas, suits have been brought against two municipalities, Cherryvale and Seneca. The former case was decided against the city but has been appealed. An oil company was joint defendant, and, in the opinion of the attorney for the city, it was not determined how far the oil waste and how far the effluent from the city purification plant injured the cattle. The latter case has not been settled.

In Idaho a complaint that the effluent from the bleach silo of a sugar factory was harmful to cattle was investigated by the state board of health which decided that the complaint was unfounded.

Theodore Horton of the New York State Department of Health writes that the board has frequent complaints in regard to the poisoning of or the killing of cattle by manufacturing wastes, but that none of the studies of the cases has led to definite conclusions in regard to the association between the health of animals and the drinking of such polluted water.

The Wisconsin State Board of Health reports that some of the citizens of Beaver Dam complain of injury to cattle from drinking water contaminated by refuse from a gas plant.

Several boards mention that it is conceivable that cattle wading in sewage polluted streams may possibly have their udders infected with the germs of typhoid fever and so spread the disease through milk. One board states that a large New England city, for this reason, refuses to receive milk from persons whose cows have access to a certain stream.

Herman Stabler of the United States Geological Survey mentions two interesting cases where streams pollution in Ohio led to the institution of legal proceedings. One of these cases was at Shelby, Ohio, where an acid iron waste discharged into a small stream; and the other was at Ravenna, Ohio, where the effluent from a finishing establishment crossed pasture lands. Though in at least one of these cases damages were paid, Mr. Stabler says that he does not know of a case of any kind where there seems to be conclusive evidence that injury has been done to stock by polluted waters.

It is perfectly apparent from the replies that have been received that the danger of parasitism becoming prevalent amongst domestic animals through the agency of streams pollution has not been thought of. Henry B. Ward of the University of Illinois brings out the importance of parasitism very clearly in the following letter:

"So far as the protozoan parasites are concerned, it must be said that they are almost entirely unknown, especially so far as the life-history and methods of probable infection are concerned. One is justified in saying that the intestinal parasitic protozoa, of which there are a number of very important forms, are introduced through drinking water, and that the presence of a single infected animal will pollute the stream and cause serious damage to domestic animals using the water further down. Very likely, other protozoan parasites may also be transmitted through water. The only forms which are certainly excluded are the blood-parasites transmitted by tick or insect bite.

"The trematodes, or flukes, all have an intermediate stage in snails. Infected cattle will pollute the water with the eggs of these parasites. The embryos escape readily and infect the snails. From these the next stage escapes to reinfect the same or other cattle. The parasite is naturally and widely distributed along the line of a water-course.

"Among cestodes or tapeworms, the eggs reach cattle by water or on vegetation, and stream-pollution is the means by which the parasite is disseminated. It becomes, consequently, an essential element in the maintenance of the infection. Cattle and pigs both acquire infection with the bladderworm stage through using polluted water, even though occasionally infected food brings about the same result.

"Among the nematodes, or round-worms, conditions are so varied, and, as a matter of fact, so little known, that it is difficult to make any general statement. The eggs of various whipworms, or threadworms, reach the new host, in many cases certainly through the water-supply. The well-known stomach worm of pigs, which is also a parasite of man, is probably transmitted by contamination of food ordinarily, but may well be transported over considerable distances, and introduced into the new host through the medium of water-transport of eggs. However, it must be confessed that most of the roundworms have been so little investigated that one is compelled to speak in general terms, rather than definitely, regarding the method of protection."

To sum up this matter, it has not been thoroughly studied and it seems to offer a legitimate field of investigation to the several experiment stations. It is clear that streams pollution may inflict injury on cattle through

(1) Anthrax.
(2) Metallic poisoning.
(3) Parasitism.

Dept. of Municipal and Sanitary Dairying, University of Illinois, September, 1912.

METHODS EMPLOYED AND RESULTS OBTAINED IN IMPROVING THE MILK SUPPLY OF SPRINGFIELD, MASS.

J. A. GAMBLE,

Milk Expert of Department of Health, Springfield, Mass.

Read before the International Association of Dairy and Milk Inspectors, Milwaukee, October 25-26, 1912.

"The campaign for cleaner and better milk for the city of Springfield began in the summer of 1908 with the adoption of the score-card system of dairy inspection of all dairies sending milk into the city, and has been carried on in a systematic manner ever since. The problem of supplying milk to 100,000 people daily is surrounded by a great many difficulties, and, in undertaking to improve the sanitary conditions of the milk supply, the whole subject has been gone into very thoroughly so that the large financial interests involved in each part of the business should be fairly dealt with in making the desired changes demanded in the modern methods of producing, handling, storing and delivering milk."

INTRODUCTION OF THE SCORE-CARD AT THE FARM.

The introduction of the score-card at the farm requires no little tact and judgment on the part of the Dairy Inspector. For decades dealers had bought the milk from the different dairies at their own price, making no distinction between clean and unclean dairies. As long as the milk was white in color, it was saleable and all alike to them and all producers received the same price. No distinction was made as to the particular shade of white produced, and no credit was given to the naturally careful man, who prided himself on the appearance of his cows and the cleanliness of his dairy. Those naturally careful farmers received no credit or better price for their product than the more shiftless ones. The argument advanced by the clean dairyman that he took extra pains with his milk and ought to have extra compensation, had no effect as far as the price was concerned, upon the contractor. The result of this was that most of the natural high grade dairy farmers were in time forced to adopt the cheaper methods of producing milk or get out of the business. This was the state of affairs that confronted the inspector on his first visit.

CONDITIONS FOUND AT THE DAIRY.

The Dairy Inspector found the dairies would fall into three distinct classes: those having a score or rating above 70 per cent. perfect, those between 60 per cent. and 70 per cent. perfect and those rated under 60 per cent. Dairies scoring below 50 per cent. were given a chance to make alterations at once. In those cases where there appeared to be no chance of this taking place, the dairy was immediately eliminated.

The first class dairies or those scoring 70 per cent. and higher were few in number and limited to the farms of those natural dairymen who possessing sterling qualities, had the ability and enthusiasm to maintain clean places in spite of low prices received for milk. The second class dairies or those between 60 per cent. and 70 per cent. were found more often. This was especially true in dairy sections where high grade barns had been built to hold the abundance of hay and grain. With an improvement of methods these dairies would all have been found within the first class, or scoring 70 per cent. perfect or higher.

The majority of all dairies were found in the third class or those dairies scoring less than 60 per cent. perfect. The conditions existing at those dairies was the result of general farming and low prices. Cows were kept to eat hay and produce fertilizer in the barn and the herd made work for the proprietor and hired men night and morning, and rainy days.

On the first visit of the Dairy Inspector, a score card was given to each dairyman as his dairy was being scored. He also was invited to accompany the Dairy Inspector and ask questions about a number of points given each subject in scoring. This gave him an opportunity to become familiar with the working of the score card and he quickly saw its usefulness in getting at the exact standing of his dairy. In each case the Inspector pointed out the defects noted, and explained to the dairyman the effect these had on the quality of his product. He offered suggestions for the correction of these defects and gave general advice as to how the dairy and milk house could be made cleaner and do more effectual work.

At first a great deal of confusion existed in the minds of dairy men as to the practical value of this new system of dairy inspection. Gradually, however, they became acquainted with the requirements of what constituted a dairy suitable for the production of high grade market milk and the score card which at first had seemed complicated, became a source of inspiration to them. Dairymen began to realize that an improvement of their dairies and the correction of defects, as pointed out by this score card, gave them a better product.

Improvement Noted at the Dairies.

On later visits of the Dairy Inspector he noted that the first class dairymen had taken early advantage of suggestions. To them the value of high grade milk was no new thing and anything which would tend to improve their product was at once adopted. At the second class dairies, the barns began to look a little better. The cow stable had lost its neglected look. Cobwebs had been swept down, floor and mangers improved and the stable given a good coat of whitewash. The manure had disappeared from the flanks of the cows and they looked more clean and healthy than at the first inspection.

The condition of many of the third class dairies showed little improvement. A few had taken time to do some fixing up, but in a majority of cases very little had been done. There seemed to be several reasons for this, as: some of those dairies were on hired farms, with the farmer struggling along the best he could under adverse conditions, not owning the farm, he was reluctant to change or in any way improve the property. In other cases, the farms had been handed down from generation to generation and the methods practiced were grandfather's and "good enough" for the present incumbent.

It was apparent to the Dairy Inspector, after visiting all the dairies sending milk into the city, that the third class dairies, if improvement were expected and the daries lifted to a position where they could produce ordinarily clean milk, frequent inspection was necessary. He readily saw that these third class dairies would demand the most attention from the Health Department. It has been found, in some cases, that by writing to the owner of the property, that the Inspector has been able to get improvements on those farms which have been leased. In many of these places, too, the situation has called forth very little work to improve them, it was simply a case of tearing down useless partitions, and letting in more light and air.

To ascertain the percentage of general improvement, fifty dairies having an average score of 53-11/100 on the first inspection were taken by the Department. These were scored again on a later inspection. The average score of the fifty dairies on this second inspection was 59–59/100 or an improvement in equipment and methods of 12–15/100 per cent. These figures illustrated to the Department, the value of the dairy score-card system of inspecting dairies and afforded definite knowledge of the efforts made by the producers in improving the sanitary conditions attendant on the production of market milk and at the same time pointed the direction in which further improvements could be made. One year later, in order to find the average percentage of general improvement in dairies as indicated by the use of the score-card, one hundred and fifty score-cards were taken in the order in which they had been visited and scored by the Dairy Inspector. Of this number of dairies twenty-four were found to have decreased in standing but the general average improvement of the hundred and fifty was a trifle over 7 per cent. Twenty-five of these dairies showed an average improvement of $24\frac{8}{10}$ per cent.; five dairies an average increase of $43\frac{7}{10}$ per cent and one dairy a gain of $55\frac{3}{10}$ per cent. To find what effect this yearly increase in the dairy score card had on the bacterial count of the milk, twenty samples were taken from twenty ten-quart cans coming from the different dairies on August 23, 1910. On July 27, 1911, or almost one year later, with the atmospheric conditions surrounding the taking of the samples as near similar to the first as possible, twenty samples were again taken from these dairies.

The average temperature of the first samples was 62 degrees Fahrenheit and the average of bacteria per sample 577,000. On July 27, the next year, the average temperature was 46 degrees Fahrenheit and bacteria per sample 130,850. It will be noted, in the second column, that the bacteria in dairies No. 2, 3, 4, 9 and 19 are higher than in the previous year. In no cases, however, was the increase in the number of bacteria per sample as great as the decrease noted in 12, 13 and 15. This would seem to indicate that even those dairies which showed no improvement did not deteriorate enough to materially effect the general improvement of dairies sending milk into the city. Samples were taken with conditions as near alike as possible. It is seen that the average temperature of the twenty samples taken in 1910 was 62 degrees Fahrenheit and the average bacteria count 577,000 per cc. The average temperature of the samples taken the following year from the same dairies and under the same conditions was 46 degrees Fahrenheit and the average bacterial count 130,850 per cc.; a decrease in temperature of almost 26 per cent. and a decrease in bacteria of over 75 per cent. It is safe to assume from these facts that the decrease in the number of bacteria was due in part to an increase in the efficiency of equipments and methods at the dairies where the milk was produced as well as to the decrease in temperature.

VALUE TO THE HEALTH DEPARTMENT.

Score cards from each dairy are kept on file at the laboratory for the information of the Department and general public. These cards give the location of each dairy, the number of cows kept and the breed, and stated whether ensilage or brewer's grain was fed, and the number of quarts produced at that dairy. It gave the name and address of the dealer to whom milk was shipped and also a complete score of the equipment of and the methods practised at the dairy.

Each dairy scoring over 50 per cent. perfect was given a permanent dairy number and the regulation made that these numbers should appear on all cans coming from that dairy. This number made possible the quick identification of milk from any dairy, and enabled the Department to trace back any complaint of contamination, disease, bitterness, ropiness, sourness, dirt or other trouble in the milk. Samples for chemical analyses are taken every thirty days from the milk from each dairy, and, in the warm summer months, bacteriological samples taken from the different dairies as the milk is being sold upon the streets. On file, then, at the Department is the exact standing of the dairy, regarding its sanitary situation, its equipment and the methods practised; the chemical and bacteriological analyses of its milk. This information has built up a Bureau of Information for the Department and consuming public which gives the actual condition under which the milk is produced and setting forth the care it has had since that time. Any consumer by calling at the Department can find out anything they wish to know regarding the dairy from which their milk was obtained.

Those taken August 23, 1910.			Those taken July 27, 1911.		
Sample.	Temperature.	Bacteria.	Sample.	Temperature.	Bacteria.
1	64	70,000 per cc.	1	46	10,000 per cc.
2	64	320,000 “ “	2	46	400,000 “ “
3	64	10,000 “ “	3	46	460,000 “ “
4	64	20,000 “ “	4	46	370,000 “ “
5	64	50,000 “ “	5	46	10,000 “ “
6	64	460,000 “ “	6	46	140,000 “ “
7	64	130,000 “ “	7	46	27,000 “ “
8	64	110,000 “ “	8	46	60,000 “ “
9	64	10,000 “ “	9	46	50,000 “ “
10	64	400,000 “ “	10	46	250,000 “ “
11	64	160,000 “ “	11	46	10,000 “ “
12	64	2,000,000 “ “	12	46	40,000 “ “
13	64	6,000,000 “ “	13	46	460,000 “ “
14	64	40,000 “ “	14	46	40,000 “ “
15	64	1,200,000 “ “	15	46	10,000 “ “
16	56	80,000 “ “	16	46	10,000 “ “
17	56	330,000 “ “	17	46	40,000 “ “
18	56	70,000 “ “	18	46	40,000 “ “
19	56	20,000 “ “	19	46	140,000 “ “
20	56	60,000 “ “	20	46	50,000 “ “

Average temperature, 62 degrees F.	Average temperature, 46 degrees F.
Average Bacteria 577,000 per cc.	Average Bacteria, 160,850 per cc.

Value to the Farmer.

Here for the farmer is rated the standing of his dairy, the amount of milk produced, the location and exact standing of his plant and product, so that doctors and mothers may have exact knowledge of the merit of that product, this gives the producer the benefit due his endeavors, and a chance for subsequent patronage and an advanced price for his product. Each dealer, before taking on any dairy, must first make application to the Health Department for the taking on of said dairy. Thus the Department knows at all times who is handling milk from the different dairies. At the Department the producer may also get reliable information regarding the standing of any dealer. This system credits good, rich, pure and therefore long keeping milk to the careful, industrious dairyman to whom the credit of producing such a high grade milk belongs.

Does it Pay?

"The production of milk is purely a business proposition and it is hardly to be expected that any producer will be interested in producing clean milk unless he can obtain a fair recompense for the time involved and capital invested and it is an evident injustice to compel him to assume additional expense, labor and detail, involved in the production of clean milk and then refuse to pay him for it." To find if any relation existed between the quality and price, a canvass was made of the price paid for all milk coming into Springfield from all three classes of dairies. It was found that the average wholesale price of milk received by first class dairies was $4\frac{7}{10}$c. per quart: that the average of all the second class dairies was $4\frac{1}{8}$c. per quart, and that the average prices received at third class dairies was $3\frac{9}{10}$c. per quart.

The average price received by the third class dairies was greatly increased by those third class dairies near the market who received a correspondingly higher price because of their nearness. It will be seen that the difference between the first and second class dairies is only 22–1/2/100c per quart per day, but assuming that the dairy produces 200 quarts, the advance became 45c. per day and this amounted to $164.25 per year. An advance from the third to the first in price and standing would be $\frac{8}{10}$ of a cent a quart and for a 200 quart dairy $1.60 per day which amount to the astonishing sum of $584.00 a year. From the second to the first, would be an advance of 6/10 of a cent a quart; this in a like dairy of 200 quarts would mean $1.20 a day or $438.00 per year.

It is noted that the score card, although it may not be perfect, is the most tangible means we have of getting exact relative standing of dairies. It points out the defects and leads the improvement in the dairies themselves and their product and at least in the case of one city, has assisted the farmer to get a corresponding price for increased quality of milk.

Great credit is due Dr. E. H. Guild and the members of the Springfield Board of Health in the adoption of the score card system of dairy inspection and the formulation of regulations, which with continual efficient effort directed along right lines has made this improvement possible.

PROGRESS REPORT OF COMMITTEE ON STANDARD METHODS FOR THE EXAMINATION OF AIR.

Read before the Laboratory Section, American Public Health Association, Washington, D. C., September, 1912.

The Committee on Standard Methods for the Examination of Air made its first report three years ago recommending certain standard procedures for the determination of temperature, humidity, light, carbon dioxide and bacteria (published in the *American Journal of Public Hygiene* for May, 1910). At that time, very little work had been done from a practical sanitary standpoint on the physical and bacteriological aspects of our work, and the report was necessarily of a somewhat tentative nature. At the Havana meeting of the American Public Health Association, the committee was continued with the following membership: Dr. T. R. Crowder, Prof. M. J. Rosenau, Dr. G. A. Soper, Mr. J. Bosley Thomas, Prof. John Weinzirl, and Prof. C.-E. A. Winslow, chairman. The committee felt that a revision of certain sections of its earlier report was clearly desirable. In the time at its disposal, it has not, however, been able to arrive at final conclusions. There are still but few workers engaged in the practical study of atmospheric conditions from the sanitary standpoint, and the chemistry and bacteriology of air are far less developed than the chemistry and bacteriology of water and milk.

Before a definite and final report worthy of the confidence which the name of the committee and the association imply, can be made, much more research will be required. Methods will have to be tested, compared and, in some cases, actually devised. Two or three years of time should be given to the committee for this work and the committee respectfully asks for this time. By the end of such a time the committee believes it will be able to announce a set of definite procedures which can confidently be recommended as worthy of adoption as standard.

Meanwhile, however, the committee submits the following interim report showing the present progress and tendency of its work. It is hoped that such suggestions may be of some assistance to the workers in this field during the coming year and that they may bring from such workers the suggestions and advice which the committee needs for the completion of its work. The present report is, however, in no sense to be taken as a final and definite one.

DETERMINATIONS TO BE MADE IN THE EXAMINATION OF AIR.

The original conclusion of the committee, that the determinations of temperature, humidity, dust and intensity of light provide the most important data to be secured in a sanitary study of atmospheric conditions, while tests for carbon dioxide and bacteria are useful for special purposes, seems to have been amply confirmed by subsequent experience. The committee believes, however, that the time has come for the inclusion of chemical tests for certain specific poisonous substances, like carbon monoxide, wood alcohol, arsenic and the like, which are discharged into the air by the combustion of fuels and in the course of industrial processes and which have an important bearing on the public health.

Temperature and Humidity.

The standard methods recommended in 1909 for the measurement of temperature and humidity—the recording thermometer and the U. S. Weather Bureau Sling Psychrometer—appear on the whole to have proved quite satisfactory, and the committee believes that no essential change in either is desirable. The swinging joint of the sling psychrometers on the market gives a little trouble in practice and some observers have complained of serious breakage of the instruments in the hands of their inspectors. General experience, however, seems to indicate that with a little training inspectors learn to use the sling psychrometer without serious difficulties.

Dust.

The committee in its 1909 report recommended two procedures for determination of the number of dust particles present in the air,—the use of the koniscope and the sugar filtration and microscopic counting method.

The committee hopes to study the koniscope further during the coming year, but is at present inclined to the view that this instrument is much less suitable for general sanitary purposes than is the filtration method. The standardization of the koniscope offers serious difficulties since it depends upon the recognition by the eye of the depth of color produced by fog in a vacuum tube. More serious, however, is the fact that the koniscope reveals all the minute ultra-microscopic particles in the atmosphere and thus masks the differences in the number of fairly large particles (such as industrial dusts) in which the sanitarian is interested. For example, in a recent study of the air of New York streets and schools by the filtration method, it was found that the number of dust particles generally varied between 400,000 and 1,000,000 per cubic foot. Macfadyen and Lunt (*Transactions of the British Institute of Preventive Medicine*, I, 142), on the other hand, found about 9,000,000,000 dust particles per cubic foot in ordinary indoor air by the use of the dust counter, which works on the same general principle as the koniscope but is the more exact instrument. The dust counter determines exactly, and the koniscope determines approximately the number of particles down to a very high degree of fineness of the particles. What is needed for sanitary purposes is a reasonably accurate determination of the comparatively few, but rather large, particles which lacerate the epithelial tissues and favor the development of disease.

The filtration method gives this latter information, accurately measuring the number of particles large enough to be seen under a $\frac{2}{3}$ inch objective. As tested out by members of the committee it has proved on the whole satisfactory. The worst feature of it is the slowness of the sampling process due to the necessity of forcing a large amount of air through the small sugar filter. This difficulty has been mitigated to a considerable extent by the following changes: Instead of using a small glass tube, as recommended in the 1909 report, the committee in its recent studies has used a chemical adapter (a conical piece of glassware seven inches long having openings of $\frac{5}{8}$ inches at the smaller end and $1\frac{1}{2}$ inches at the larger end). The small end is closed with a perforated rubber stopper over which is placed a piece of bolting cloth to support the filtering layer made up of about 2.5 grams of granulated sugar, forming a layer 1 cm. deep. This modification of the older sugar filter was devised in the course of an investigation of the air of New York schools carried out by Prof. Charles Baskerville and the chairman of this committee. Five cubic feet of air can be drawn through this filter in eighteen minutes. The sugar is dissolved and the contained dust suspended in 10 cc. of distilled water and 1 cc. of the suspension is placed in a Sedgwick-Rafter counting cell and counted under the $\frac{2}{3}$-inch objective.

Another method of determining dust particles which is still quicker and simpler, has been used by Dr. C. T. Graham-Rogers of the New York State Department of Labor and was described by him in a paper read before the International Congress of Applied Chemistry in New York. He uses a glass cylinder 8 cm. in diameter and 20 cm. long with the top and bottom closed by perforated round glass stoppers. About midway in the cylinder is suspended a Petri dish of such a size as almost, but not quite, to fill the cylinder. The Petri dish is ruled in squares and smeared with glycerine. The air to be examined is drawn downward through the cylinder, so that it strikes the surface of the glycerinated plate and deposits its dust particles before finding its way around its edges, and the particles so deposited are counted directly under the microscope by the aid of the rulings on the plate. The committee hopes to make a study of this procedure in comparison with the sugar filter method during the coming year.

For collecting samples for dust determination, the following apparatus was found serviceable in the study of New York schoolroom air, to which reference has been made above. The air was drawn through the filter by means of a double suction pump (Eimer and Amend No. 750) which is like a bicycle pump except that it has a double acting valve. To compensate for the puff of back pressure at the end of a stroke, a tight tin box was placed between the pump and the filter as an equalizing chamber. On the other (or pressure) side of the pump was connected a standard Brazilian type gas meter for measuring the amount of air filtered.

ILLUMINATION.

The committee believes that careful study should be given to the Sharpe-Millar photometer and other recognized methods of measuring the intensity of illumination in the hope of finding a procedure which will be superior to the use of sensitized paper recommended in 1909 and which will still involve the use of neither very costly nor cumbrous apparatus.

CARBON DIOXIDE.

In the 1909 report the Petterson-Sondén and Petterson-Palmquist methods were recommended for accurate work, but on account of the cost and complexity of the apparatus the Cohen and Appleyard time method was recommended for practical sanitary work. Evidence has accumulated, however, which indicates the unreliability of the latter procedure; and meanwhile the apparatus required for the Petterson method has been simplified and cheapened. There are at least two forms now on the market which are reasonably satisfactory and one or the other of them may probably be adopted as standard after further study. The general principle of all these methods is the measurement of a given volume of air and the absorption of the contained carbon dioxide in potassium hydroxide. The remainder of the air is measured, thus giving the volume of carbon dioxide by difference. The air is measured accurately by means of readings on a very finely graduated capillary tube, and all measurements are, of course, made at the same temperature and pressure. The principle is simple but dependable results are obtained only after considerable practice and a thorough mastery of the technique of operation.

A modified form of the Petterson-Palmquist apparatus has recently been prepared in this country by Eimer and Amend of New York, which can be obtained for about fifty-five dollars. It has the advantage of a considerably reduced bulk, and it is portable when fitted with an outer casing. Samples of air can be analyzed with this apparatus in about five minutes by a careful and skillful operator. It has been tested extensively by one member of the committee (Doctor Crowder) and by Doctor Graham-Rogers, and has been found eminently satisfactory.

The other apparatus which seems most promising is the portable apparatus designed by Haldane for the determination of CO_2 O_2 and CH_4 described in the *Journal of Hygiene*, for 1906, p. 74. This apparatus can be obtained from F. P. Rittenhaus & Co., 53A Huntly Street, Tottenham Court Road, London, W. C., at a price of $20 and requires about three months to import. Eimer and Amend can make the same apparatus for $35 in about two weeks. Rittenhaus, according to Haldane, also makes a much smaller apparatus for CO_2 only, for $15 (described in Notter and Firth's *Hygiene*). The larger Haldane apparatus has been carefully tested by one member of the committee (Doctor Rosenau) and found to be simple and accurate. It should be noted that the Haldane apparatus is made up in two forms, one for use in mines and one for ordinary use. The mine apparatus is not sensitive enough for use in ordinary ventilation studies.

For the Petterson-Palmquist or the Haldane methods of analysis the samples are collected in two-ounce, glass stoppered bottles of clear glass if the analysis is not made with the portable apparatus on the spot. These bottles hold about 70 cc., which is enough air to make two analyses, in case it should be necessary—and it is always advisable—to repeat determinations. The stopper of each bottle is greased with petrolatum, or with a mixture of petrolatum and soft paraffine which will spread readily under pressure; and after the sample is taken, the stopper should be turned round and pressed down until no air channels are visible in the petrolatum. The stopper is held in position by a stout elastic band passed over it, and a gummed label is placed on the bottle.

The bottles *must* be dry, and they should also be clean. They should be rinsed with clean (preferably distilled) water and completely dried. If a bottle is wet and dirty an appreciable amount of CO_2 may be produced or some may disappear by bacterial action. If, on the other hand, the bottle is wet and clean, carbonic acid gradually disappears, as it is absorbed by alkali dissolved out of the glass by the water. In *dry* bottles, even though dusty inside, no sensible alteration takes place within a fortnight or more.

The sample may be collected as follows: One end of a piece of rubber tubing, two or three feet long and one-eighth or one quarter of an inch in diameter, is introduced to the bottom of the bottle, the other end being held in the mouth. A deep breath is then sucked in through the tube, so that the bottle is completely washed out by the surrounding air. The tube is removed while the air is being still sucked in, so as to avoid any risk of the breath passing backward into the bottle. The stopper is then inserted, turned around, and secured as already described, and particulars written on the label. Care must, of course, be taken that the sample be not contaminated in any way by the presence of persons or lamps. If it is desired to take samples at some distance from the operator, the plan may be varied by fitting the breathing tubes by a glass connection to one of the holes in a double bored rubber stopper which will just fit the bottle. Into the other hole, and ending just below the stopper, should be fitted another tube through which the air enters. If this second tube has great length, several breaths should be sucked through in succession, in order to entirely displace the air originally contained in the tube.

Samples may be first collected in large rubber bulbs, such as are used with the Paquelin cautery or the sphygmomometer, and then transferred by passing the outlet tube to the bottom of the bottle. If the bulb holds 800 or 1000 cc. there need be no fear about completely displacing the original air of the bottle. This method has the advantage that one sample of the air may be collected from many points in a room, and will in consequence be an average sample.

The water siphon method, the steam vacuum method, and others discussed in our earlier report have the disadvantage of a wet container. This may not matter if the analysis is to follow immediately upon the collection, but it is not recommended where any considerable interval is to elapse.

When larger containers than can be manipulated readily by breathing are to be used, some sort of a small hand bellows or suction pump is recommended for displacing the air in the container.

Care must be taken in transferring the air sample to the apparatus, that there is no contamination. A method which has proven very satisfactory and is free from sensible error in the use of the Petterson-Palmquist method of analysis is as follows:

Remove the stopper of the bottle containing the sample to be analyzed under a saturated solution of pure sodium chloride. A little air will escape or a little of the solution will enter and by this the pressure in the bottle will be equalized to that without. Lift the bottle until the fluid in the neck is level with the surface of that in the basin. Slip a finger over the mouth of the bottle and transfer to any convenient stand near the mouth of the pipette. Slip the finger off sideways and immediately insert a double-bored rubber stopper which will fit snugly. This stopper should be previously made ready for use by inserting two small glass tubes through its bores, one of which will reach well toward the bottom of the bottle, and one of which ends just below the stopper. To the longer glass tube is attached a rubber tube which acts as a siphon leading from a large bottle of saturated sodium chloride solution placed at a higher level. This siphon is kept always full of the solution which is held back by a pinch-cock. To the shorter glass tube is attached a very narrow rubber tube (a small catheter with a conical tip answers best) which will reach to the mouth of the apparatus. As soon as the stopper is in place, press the pinch-cock and thus allow the salt solution to run into the bottle. This causes some of the sample of air to flow out through the small tube. When all of the air originally contained in the tube has been displaced, the free end is attached to the pipette and the air let in, being forced out of the bottle by the flowing salt solution.

After equalizing the pressure in the bottle by the process described there is no sensible interchange of gases during the moment of removing the finger and inserting the rubber stopper.

Detection of Poisonous Gases.

It would be desirable in the future to formulate standard methods for the estimation of a number of gases and noxious vapors which may be found in the air of factories and other industrial establishments, and for the carbon and tar represented in soot, and the sulphuric acid which exerts important effects in city air. The committee has been unable to go into this aspect of the work as yet, but desires to call attention to two methods used by Doctor Graham-Rogers in the work of the New York State Department of Labor as deserving of special study.

In one method used by Dr. Graham-Rogers for the determination of carbon monoxide air is drawn through U tubes containing caustic potash, sulphuric acid and anhydrous iodic acid along with three to four times the amount of large pieces of pumice stone. Heating in an oil bath at 150 degrees converts the carbon monoxide to carbon dioxide and liberates iodine which is titrated with $\frac{1}{1000}$ normal sodium thiosulphate. When 3-4 liters of air are used, one part in 40,000 parts of air can be detected.

For the determination of wood alcohol, Doctor Graham-Rogers aspirates 250–500 liters of air through wash bottles containing distilled water. A fractional part is allowed to stand half an hour with 4–5 grams of potassium dichromate and 3–4 cc. of concentrated sulphuric acid. The formic acid produced may be estimated by acidimetry or saturated with barium sulphate and precipitated as barium formate.

Bacterial Count.

The most important new method suggested for enumerating the bacteria in air since our 1909 report is that described by Rettger in the *Journal of Medical Research* for June, 1910, in which air is bubbled through water by the use of a glass bulb with very small perforations. This procedure seemed promising and has been carefully studied and compared with the sand filter method by members of the committee (Professor Weinzirl and Mr. Thomas).

In setting up the apparatus each used the sand filter as described in the standard methods, but it soon appeared that some modification was necessary. It was evident that the large opening of the sand filter tube might receive, by the direct settling of dust, a greater number of bacteria than the smaller opening of the aëroscope. Mr. Thomas met the difficulty by protecting the opening with an aluminum shield, while Mr. Weinzirl reduced the size of the opening by inserting a stopper fitted with a glass tube of the same diameter as the aëroscope tube and bent in a similar manner. The aëroscope also differed slightly; Mr. Thomas omitted the bulb, but closed the end of the tube, filed notches nearly through the walls, and made the holes in these notches with a very sharply pointed file, while Mr. Weinzirl duplicated Rettger's apparatus. It is believed that this difference is not essential.

In the trials the filter openings were as near together as possible, the distance being usually an inch or less. The bacteria were supplied by beating cloths which had been rubbed over the laboratory floors and steps. Eight-liter, graduated bottles were used as aspirators, the rates of filtration being equalized by means of screw clamps applied to the siphons. It was difficult to maintain exactly uniform rates of filtration, but care was taken to obtain as nearly uniform rates as possible before the air was charged with dust.

Under the conditions as outlined above, the results obtained agreed fairly well, although Weinzirl secured almost an equal number of excesses for both methods, while Thomas secured excesses only by the sand filter method. As the excesses (particularly those obtained by Weinzirl) are not large, and as the second tubes show only small numbers of bacteria, the two methods compare favorably so far as accuracy is concerned.

The question then resolves itself largely into one of the comparative convenience of the two methods. While it is somewhat easier to make plates from the water filter, we find the sand filters in every way easier to operate. The aëroscopes are more difficult to make, or more expensive if purchased; they are more easily broken; and when being handled they frequently get out of order. Again, sand filters, if protected, may be used some time after being sterilized, while the aëroscopes tend to lose water by evaporation during sterilization and storage, thus vitiating the accuracy of the work. In actual sanitary work, when many samples are to be taken, and at a distance from the laboratory, we believe that the aëroscopes would give more trouble than the sand filters. Although no work has been done to confirm the belief, it seems not improbable that under certain conditions the absorption of sulphur dioxide or other gases in the five cc. from ten to twenty liters of air might have a restraining action upon the growth of some of the organisms absorbed.

The corks used in the sand filters are soon ruined by the heat, and unless great care be exercised, they are liable to leak. It was found that rubber stoppers may be substituted if the tubes are sterilized in the autoclave. We would recommend their use.

It was obvious, as mentioned above, that the large opening of the tubes permits gross particles to enter by force of gravity. We would, therefore, recommend that the mouth be closed by an additional stopper fitted with a very short glass tube bent at an angle of about 45 degrees.

In the comparative tests the absorption efficiency of the tubes was probably more severely taxed than it would be in actual practice. In our judgment, the use of the second tube affords but little additional advantage, while it does render the method cumbersome, and the slight additional accuracy does not justify the extra labor involved. We would, therefore, recommend the use of single tubes only. Otherwise the method recommended in 1909 seems on the whole satisfactory.

Respectfully submitted,

T. R. COWDER.
M. J. ROSENAU.
J. BOSLEY THOMAS.
JOHN WEINZIRL.
C.-E. A. WINSLOW, *Chairman.*

DOCTOR SOPER'S REASONS FOR DECLINING TO SIGN THE REPORT OF THE COMMITTEE ON STANDARD METHODS OF AIR ANALYSIS.

1. I object both to the form and substance of the majority report.

2. I have not been given a chance either to test the new methods referred to or give them the careful thought which they should receive from each member of the committee before being reported upon.

3. In many respects the majority report is open to severe criticism such, for example, as was properly made against the first report of this committee.

4. The theory of the report is wrong. The committee should not report methods which merely seem worthy of study, but should do the studying required and announce the results in plain and concise language.

5. In the absence of the sound and sufficient knowledge which should lie at the bottom of the report, the committee should be brief and conservative.

GEORGE A. SOPER.

BOOK REVIEWS.

House Sanitation, a Manual for Housekeepers. *By Marion Talbot.* (*Whitcomb & Marrous, Boston, Mass., 109 pages, price 75c.*)

This little book has been written to take the place of Mrs. Ellen H. Richard's book on Home Sanitation, which was published some twenty-five years ago and is now out of date. The present book, while entirely rewritten, contains all the useful matter of the older text and also the results of later experience and research in sanitary science, thus bringing it up to date. As the author says in her introduction, it is an endeavor to replace outworn theories and useless practices with such modern views and practical suggestions as will best help the professional housekeeper in her effort to maintain her household in health and physical efficiency with the least expenditure of money, time, and strength. Some pages are given to a discussion of the new sanitation, showing how modern scientific research and the practice of hygiene has changed the early Christian beliefs that disease was caused by the wrath of God or the malice of Satan into a knowledge that health depends largely upon freedom from infection and good sanitary surroundings. The reader is shown why the housekeeper is responsible for the sanitary condition of her home, and a detailed account is given as to what the housewife should know in order to keep the inmates of her home in health. The dangerous qualities of an unsanitary house are pointed out and attention is called to the fact that women who are so often confined to the house by their work suffer most from unhygienic surroundings which slowly and insidiously undermine their health, producing languor and preventing sustained effort. The importance of selecting a healthful site for the home is emphasized and it is shown that while defective construction may generally be remedied, unhealthy surroundings, an undesirable aspect, or insalubrious building site cannot be changed. The chief essentials to be secured are pure air, sunshine and dryness, as these are conditions upon which physical and mental vigor largely depend and without them the human system loses its power of resistance to disease. A very good description of the plumbing system as installed in modern houses is given, together with suggestions for keeping it in condition. Air, ventilation and furnaces, light and lighting, together with practical suggestions in regard to furnishing are all touched upon. There are also special chapters on country houses and the methods used to control infection when a contagious disease attacks a member of the family. At the end of each chapter all the important points are summed up in the form of questions, which add greatly to the interest of the book and draw attention to the essential features.

Thomas S. Carrington.

Recherches sur L'epuration biologique et chemique des Eaux d'egout. *Calmette, A., Rolants, E., et als. Vol. VII, Paris, Masson, 1912, 360 pp. 2 plates, 20 figs, and 14 cuts. Price 10 fr.*

As in former years, this volume contains eighteen chapters in which the authors have not only described their own work but that of French and foreign scientists upon all points in that so complex a problem, the disposal of sewage and factory wastes.

The experimental station at La Madeleine, near Lille, has not been altered during the year. It was operated to study the results obtained during the previous year and to confirm the same.

The Septic tanks at La Madeleine have removed most of the suspended matter from the sewage and have caused the solution and gasification of an important part of the organic matter. At the same time it was noticed that on one or two occasions during the year the tanks were not cleaned frequently enough; in June considerable suspended matter was entrained with the effluent. The tanks should be cleaned every six months, at least.

The mixture of slag and pumice stone has proved to be the best filling material for the biological filters, also slag alone, peat and pumice stone and bricks with peat and limestone can be used advantageously. When slag is used alone, there is need, as the authors have already noted, to select hard, durable material, because the weather and the alternate wetting and drying disintegrates it to such a degree that what might be called an automatic silting away takes place. This tends to increase the voids whereby a part of the sewage escapes purification.

Beds of broken brick and pumice have always produced unsatisfactory results. They should be used for large beds in cases of necessity only.

While the sewage of La Madeleine is low in organic matter and its strength is below the average for sewage from the combined system of sewers, it is purified with difficulty because of the presence of a considerable amount of industrial waste. Also the efficiency of filtration falls very rapidly when the volume of sewage treated exceeds 500 liters per square meter a day. These experiments are being continued to determine, by detailed study, the influence of the material upon the result of purification, the same to be dependent in a way upon the relative costs of these materials.

After the disposal plant for the part of Lille in which the Abattoir was located was put in operation it was possible to investigate the feasibility of purifying abattoir wastes by biological methods, a matter considered very difficult hitherto. It was feared that the bacterial beds would not produce well oxidized and non-putrescible effluents,—the sought-for result. On the contrary, the analyses of the final effluent and those of samples taken at all stages of the process have shown that, at a rate of 600,000 gallons per A. per 24 hours, applied in 14 hours, the results have not ceased to be excellent and it is believed that the rate can be increased to one million gallons per A.

Nitrification has always been very active. The amount of nitrates in the effluent has averaged 76 Mg. per L. with a maximum of 134 Mg. The Kremer tank (Emscher type) removed 57.6 per cent of the suspended matter, a very good result when the composition and density of the abattoir waste are taken into account. In the sludge chamber the organic matter, soluble and insoluble, has been digested in great part.

The waste offers an interesting opportunity for the study of colloidal matter. Analyses have shown that this matter is precipitated in each part of the process, particularly in the Kremer tank and most completely by septic decomposition and by accumulation on the particles composing the filter material. The oxidation of the latter deposit is not complete and a portion sloughs off and is removed from the effluent, before discharge into the river, by decantation.

Of the factory wastes, that from wool scouring plants causes the most nuisance when discharged into streams. The authors have not studied the problem for long. They note the large amounts of organic and mineral matters as well as grease and the extremely slow decomposition of all by physical, chemical or biological agencies. But their purification is necessary. The authors hoped to secure the coöperation of manufacturers but were disappointed. No complete factory disposal works exist in France, although some plants have been forced to remove more or less grease from their wastes.

Study of French and foreign works has brought the authors to the following conclusions:—

The diversity of methods employed exemplifies the difficulty of the problem.

In small factories, the volume of waste being small, chemical precipitation is sufficient, but the effluent would be discharged into a sewer or large river. One can recover grease from the sludge but the effluent ought to be retreated with lime and iron sulphate to remove the impurities. In other cases simple precipitation with lime is used; the dried sludge can be treated subsequently.

The larger works are usually surrounded by the houses of the numerous workers. Of two at Robaix, one discharges 435,000 and another 1,111,000 gallons daily. Generally it is difficult to install an effective plant in the usually restricted space, although the expensive process of evaporation, most desirable from a sanitary standpoint, is adapted to close quarters.

For the present the authors recommend chemical precipitation of the wool-scouring waste and its mixture with the city sewage as the most practical and economical process. The purification of the mixed sewage and waste should be relatively simple. If possible, the disposal of wool-scouring waste by precipitation ought to be conducted at a central coöperative station, directed by a competent engineer. The effluent from the precipitation tanks should be clear and neutral before discharge into the sewers.

Chemical precipitation will effect a great betterment of the streams and put an end to the justifiable complaints by Belgium against l'Espierre and the riparian proprietors of Vesdre and l'Ourthe.

In other chapters the authors report upon French and foreign methods for purifying wastes from oil refineries, creameries, mines, paper mills, sugar refineries, etc. Studies in England and America show the nuisance produced by discharging sewage directly into tide water and the need for improvement of conditions. The questions of removal of suspended matter and sludge treatment are of capital importance; also it is interesting to note the many new processes proposed. The part played by the Septic tank is discussed at length and the conclusions of Dzersgowski are refuted in Chapter XI which also contains a description of a new biolytic tank.

Finally the last chapter takes up the control of purification. A comparison of the oxidizable matter in with the reductive power of the treated sewage should be an index of its stability. Bacterial examinations are useful in special and relatively rare cases only.

Review based on review in French in Wasser und Abwasser, *5*, 273, by E. Rolants, one of the authors.

R. S. Weston.

Principles of Hygiene. *By D. H. Bergey, M.D., First Assistant, Laboratory of Hygiene and Assistant Professor of Bacteriology, University of Pennsylvania. Fourth edition thoroughly revised. Octavo of 529 pages, illustrated. Philadelphia and London: W. B. Saunders Company, 1912. Cloth, $3.00 net.*

The present revision of Doctor Bergey's well-known treatise has been undertaken to keep it in pace with the rapid advancement of hygiene and public health. The book is prepared primarily to meet the needs of students, practicing physicians and health officers. Its object is to treat general principles with no attempt at an exhaustive treatment of detail.

The introduction places before the student a logical statement of the factors of health and disease and of the aims of hygiene and of sanitary science. These various terms are carefully defined and the influence upon health and disease of such factors as age, sex, heredity, race, conjugal condition and environment are discussed with statistical illustration.

The first chapter deals with the air. Its physical and chemical properties, and the effect of humidity, currents and climate are treated. The chapter deals in the main with impurities, with their analytical determination, and finally with the effects of vitiated air. The author appears to accept the modern views that excessive temperature and humidity are the principal hygienic factors involved, but is loath to give up the older thought of vitiated air *per se*, as a predisposing cause of various ailments, ranging from headache to specific zymotic diseases.

Upon the basis of a carbon dioxide standard, the cubic space which must be provided for each individual and the necessary amount of artificial ventilation are formulated.

Treatment of the subject of ventilation itself is modern and satisfactory, and supplies many physical data, useful in computing the efficiency of various mechanisms.

A chapter on heat opens with a discussion of the loss of heat from buildings, and the proper hygienic temperature of rooms. Direct and indirect methods of heating, the loss of radiation and the principles of hot water and steam heating are taken up. The chapter naturally deals in a most elementary way with a very large problem.

Chapter IV deals with water and water supply. The physical and chemical properties of water itself, and of various types of natural waters are discussed in some detail. One is left in considerable doubt as to the significance of the various chemical impurities that are discussed. Organic impurities are said to be of importance as indicators of the nature and extent of pollution, but all waters contain these substances. Possibly this uncertainty is a true reflection of the present state of the art, but the student would be better prepared to meet the conditions of practical public health work, were he further told that there is today a considerable body of scientists who hold that there is but little information to be had from the chemical analysis of water. It is unfortunate also that the quantitative element is omitted in the discussion of water bacteriology. Sources of water supply, the storage and purification of water and the improved health conditions following improvement in the water supply are briefly outlined. In the sections on coagulation by alum, on the softening of hard waters and on chemical sterilization, lack of familiarity with the subject is suggested. The statement (p.133) that the action of alum in the precipitation of suspended matters is most marked if calcium carbonate is present, might lead one to treat soft waters with alum. The relationship between alkalinity and the permissible dose of alum, should be pointed out.

The treatment of water softening would lead to the belief that softening related only to carbonate hardness. The statement that chlorine as hypochlorite may be added to the water in amounts ranging from 2 to 10 milligrams of free chlorine per liter of water, is undoubtedly a misprint. These amounts are ten times too high.

It is to be regretted that the revised edition of the report of the Committee of the American Public Health Association on Standard Methods of Water Analysis, issued during the past summer, was not used in place of the older superseded edition, from which extensive quotations are made.

The chapter on Sewage Disposal is unfortunate, both in the selection and in the arrangement of its material. It starts with the erroneous conception that sewage is synonymous with excreta, whereas the term sewage as used in engineering means that liquid which flows in sewers. Mr. Mills' old expression that sewage contains 998 parts of water, 1 part of organic and 1 part of mineral matter, a statement of very questionable applicability to present-day conditions, is misquoted to read,—"998 parts of water, 1 part urine, and 1 part of organic matter." Systems of house drainage are described with a curious mixture of detail and generalizations and much faulty material. The remainder of the chapter on purification comprises isolated bits of information gathered from various sources, and put together without much order. Chemical treatment, now practically out of date, is given first and most prominent treatment, although the most modern chemical process, disinfection, is not described.

Under the title of Modern Methods of Sewage Purification, the work of the Rivers Pollution Commission of 1870 and of some irrigation plants is described. Then follows a description of sand filtration, with a table of results from a non-described source, obviously referring to a trickling filter. Under this heading also an example is given of plain sedimentation and the discharge of the effluent into the stream. The septic tank is given more lengthy treatment than any other sub-division, and is followed by a short discussion of the contact bed, and a more extended one of the Garfield Coal Filter. A four page summary of disposal plants in America is quoted from the *Engineering Record* of 1900. Under sprinkling filters the generalization that sewage may be applied at the rate of two million gallons per acre per day, and that the effluent obtained will be non-putrescible, and contain about 10 per cent. of the applied bacteria is made without quoted authority. In the report of the Philadelphia experiments a rate of two hundred and fifty million gallons is said to be possible. The chapter on Sewage Disposal needs thorough revision.

The chapter on Garbage, which follows, is more successful, although exceedingly brief. Something is evidently wrong with the statement on page 181, that garbage is composed of 20 per cent. carbon and 80 per cent. water. The Ordinances of Philadelphia are quoted and a brief summary of the various methods of disposal is given.

In the chapter on Food and Dietary, the author is once more upon familiar ground. He describes the chemical composition of the body, the potential energy of foods expressed in heat units, the derivable energy, dietaries, nutritive value and cost composition, and the question of water at meals. Foods are treated with respect to their chemical composition, percentage of waste, and food values. The author takes a definite stand upon the question of the use of slightly tubercular animals, favoring the absolute prohibition of such use. Not only is there danger of infection by the butcher's knife, of the healthy portions from the diseased portions, but perfectly healthy carcasses may be similarly infected. Milk and its products are treated with reference to their composition and the possibilities of their conveying disease. Inspection of the animals and tuberculin testing is recommended. The New York City Ordinance of 1895 referring to transportation and delivery of milk, and other ordinances of the same period up to the Fifty Dairy Rules of the Bureau of Animal Industry of 1898 are quoted. It is unfortunate that in a subject in which such rapid progress has been made during recent years, the information given is not of more recent date. The question of pasteurization is not touched upon, although now required in the largest cities.

Chapter VIII deals with Exercise. It is brief, but fairly comprehensive. Chapter IX takes up Clothing and Chapter X, Personal Hygiene. The latter occupying four pages, might well have been extended at the expense of some of the more purely engineering features of the book. The chapter on Industrial Hygiene is a compilation of statistical material on this subject. It too is brief for a work of this character, and is lacking in references to the more important work of recent date.

The chapter on School Hygiene is a summary of rather self-evident facts, such as the statement that windows should never be in the front of the room, the blackboards should be opposite the windows, the heating may be either by direct or indirect methods, the building should have an abundant supply of pure water, etc. Such statements should at least be supplemented by such topics as, common use of slates and pencils, the common drinking cup and towel, the schoolhouse problem during epidemics, the disinfection of books, etc.

The chapters on Military and Naval Hygiene contain material of interest to specialists in those lines. Chapter XV deals with the soil, including ground air and ground water. The following chapter deals with Habitations.

Chapter XVII deals with the Vital Causes of Disease. It opens with a chronologic list of the various specific pathogens down to the year 1906. An extended discussion of immunity and of the various sera, including typhoid serum follows. Sections on other methods of prevention, especially of malaria and yellow fever and of the relation of insects and other animals to disease transmission are followed by a discussion of the animal parasites with specific references to the hook worm.

Chapter XVIII deals with Disinfection. Heat and sunlight are first treated. The chapter is exceedingly practical, illustrating many types of formaldehyde generator, and giving formulas for the use of many preparations. The author is emphatically in favor of the most thorough disinfection of the house after infectious disease. He also treats the question of the disinfection of public conveyances, of libraries and of barber shops and implements.

The following chapter treats of Quarantine. The older work of the Michigan Board of Health down to 1896 is used to illustrate its value. No hint of the more recent views of Chapin and others is given. The Quarantine Laws of the United States are quoted at length, and abstracts are given from those of the various states.

The book closes with a chapter on Vital Statistics. The various standard terms used in the discussion of this subject are briefly defined, although one must seek elsewhere for a confirmation of the mathematical quantities given. The chapter is unfortunately brief for so important a topic of modern public health work.

The work on the whole is of a type which will of necessity become less and less useful with the rapid accumulation of knowledge in this subject. The subject of Hygiene in all its varied aspects may at the present moment be divided into Hygiene proper, the Medical and Personal side, and Public Hygiene or Sanitation, the Engineering and Administrative side. The latter is capable of futher sub-division into a large number of important matters, each of which now has its own literature. A work which undertakes within the covers of one volume to encompass the entire field, must of necessity be not only superficial but in many of its parts out of date, if not actually misleading. As a guide to the general scheme of the broad science of Hygiene to be supplemented by more extensive reading in the recent literature in special branches, this work is to be recommended.

Earle B. Phelps.
Mass. Inst. Tech.

A Manual of Personal Hygiene. *By American Authors. Edited by Walter L. Pyle. Fifth Edition. The W. B. Saunders Company. Philadelphia and London,* 1912. *pp.* 516. Net, $1.50

About two years ago the fourth edition of this work received favorable notice in this Journal. In its present form Pyle's "Personal Hygiene" will be even more secure in its place as the best manual of moderate size covering an important field. The contributors are specialists of wide reputation. In any edited work one expects inequalities of style and questionable apportioning of space to various topics. In these respects each edition of this book has shown improvement over the preceding. There is now little included which could be spared and it is hard to suggest any important omissions.

Doctor Courtney's chapter on the "Hygiene of the Nervous System" retains its rank as the most readable and broadly helpful in the book. A section introduced for the first time is Dr. Wiley's on the "Adulteration and Deterioration of Foods." The subject is a rather unwieldy one for condensed treatment, but its inclusion is certainly desirable. It may be suggested that the general reader needs to be told more specifically which adulterations are clearly detrimental to health and which are merely fraudulent.

Percy G. Stiles.

PUBLIC HEALTH NOTES.

Co-operations from the Schools.

The November *Bulletin of the Health Department*, of the city of Asheville, N. C., contains a copy of a letter recently sent out by Professor Tighe, superintendent of City Schools, to all the teachers so that everything may be done to prevent the spread of communicable disease in the schools and to maintain the schools in a thoroughly sanitary condition:—

"To Principals:—It is necessary now to take every precaution to keep contagious and infectious diseases out of your building. So far diphtheria cases have appeared in but two schools, but unless we are very careful it will scatter to others. Please observe the following:

"1. Have janitors spray all desks and floors with disinfectant daily before sweeping.

"2. Have all door knobs and stair rails sprayed or washed three times daily. Tell children not to use stair rails.

"3. Do not permit children to exchange pencils, books, pens, or other supplies.

"4. Let each child keep his own seat. Do not permit them to sit with others.

"5. Do not permit them to hold hands in marching.

"6. Have teachers to watch carefully for sore throats and other signs for sickness each morning as children arrive in school and send suspicious cases to you to be sent home if necessary. It will be safer to send them home if there is any sign of sore throat or fever

"7. See that your building is carefully swept and dusted daily by the janitor. There should be no dust in evidence in the mornings.

"8. Have halls sprayed and swept after nine a. m., after the morning recess. In marching in and out, let there be no stamping or raising of dust.

"9. Call your teachers together and begin a campaign now for greater care and greater cleanliness among the pupils and in the rooms. Do this all without making a scare among the children, teachers or parents.

"10. The children should be encouraged to keep their mouths clean by brushing teeth and by gargling with salt water if nothing else. This work can be taken up in Hygiene lessons telling the children the necessity for such things.

"See that the janitors make the disinfectant sprays the proper strength according to directions on the receptacles."

Diphtheria Prevention.

The November (1912) *Health Department Bulletin* of Asheville, N. C., after stating that "no death is more inexcusable with our present knowledge of the disease and sure means of prevention and cure which we now possess than a death due to diphtheria," lays down for laymen the following practical rules:—

"1. Keep your children away from every case of sore throat.

"2. Report to the Department of Health every case of sore throat in your neighborhood that is not placarded.

"3. If a case of sore throat occurs in your family, call the doctor at once.

"4. Don't try home remedies, and don't wait for white patches in the throat. The worst cases begin in the nose and deep in the windpipe and show no patches.

"5. If it is at all suspicious, antitoxin, and plenty of it, should be used at once. In doubtful cases it is best not to wait for a positive diagnosis; use antitoxin.

"6. If you are too poor to pay for antitoxin, the state, through the county health officer will supply it without cost.

"7. If a case of diphtheria is diagnosed in your family, have all the other children given antitoxin to prevent them from taking the disease."

The Children's Bureau.

The number of the *American Journal of Sociology* appearing in November (1912) publishes an address on "The Children's Bureau" by Miss Julia C. Lathrop, Chief of the Bureau. Miss Lathrop reviews the history of the events leading up to the creation of the Bureau and gives credit to the various organizations influential in its establishment. The aim of the Bureau is to be a vital, coöperative force, serving the needs of the whole country, arousing a sense of personal responsibility, and stimulating the functions of states and cities and counties and volunteer associations. The work is to be carried out on a basis of the sternest statistical accuracy, so that any charge of sentimentality may be opposed by the dispassionate candor and scientific faithfulness of all its future statements.

The text of the law establishing the Bureau specially mentions that it shall investigate "the questions of infant mortality, the birth-rate, orphanage, juvenile courts, desertion, dangerous occupations, accidents and diseases of children, employment and legislation affecting children in the several states and territories." The problems of the birth-rate and infant mortality are to be taken up first, and the Chief of the Bureau believes that a careful survey of the field, with a summarization and popular presentation of the great mass of more or less uncorrelated facts already collected by various agencies, is the first duty of the Bureau. The necessity for more efficient and complete registration is to be urged upon the several states. Miss Lathrop indicates as fundamental the proposition that to know the birth-rate, as well as the death-rate, we must register the children born. To stop the loss of 200,000 infants yearly we must know when and where and why they die. To know when the nation's children should attend school, or when they may work legally, we must know their ages by legal record.

"The question has been asked if there could be a more satisfying task than that of saving the lives of 100,000 babies every year. Some may think it a more satisfying aim to make certain the welfare of those same children and of every living child. It is only a satisfying ambition to save life if we can see that health, education, recreation, and work are duly secured and harmonized to serve the true ends of life. . . .

"If this Bureau heeds the aspiration of that universal cry of human parenthood, if it really serves democracy, it will survive and grow. If not, it will perish, for that cry is as old and strong as time, as fresh and inevitable as tomorrow. That cry will be heard and will be served somehow, voicing as it does the invincible slow progress of humanity upward."

Clean Milk in Chicago.

"During August an ordinance was finally passed by the city council of Chicago requiring that the milk of the dairies supplying the city be labeled 'inspected' or 'pasteurized,' also, that the general conditions of the dairies be improved. These changes were brought about by the influence of public health committees, after the Legisature of Illinois had enacted a law prohibiting the requirement of the tuberculin test of cows and the city council had defeated an ordinance requiring pasteurized and inspected milk. The death-rate among infants has been remarkably large, the total number of deaths for the summer of 1912 exceeding the deaths of 1911, which was an unusually severe summer.

"Without doubt the passage of the above mentioned ordinance will markedly influence the question of infant mortality as such ordinances have elsewhere."

September, 1912, *Bulletin of Ohio State Board of Health.*

Pellagra.

Besides reviewing briefly many papers on the etiology, symptomatology, pathology and treatment of pellagra, as presented before the Association for the Study of Pellagra at its meeting at Columbia, S. C., October 3–4, 1912, the November 1st number of *Public Health Reports* summarizes the resolutions passed by the association in these words:—

"The belief was expressed that the ultimate cause of pellagra is unknown, but that in view of the incrimination of spoiled corn 'measures should be taken by the proper authorities to prevent its sale and consumption as food.' The conviction was expressed that 'no satisfactory evidence has ever been submitted which shows pellagra to be directly transmissible from man to man; and, in the present state of our knowledge this association regards measures of quarantine and isolation for this disease unnecessary and unwise.' The opinion was also expressed that 'there is at present no known specific remedy for pellagra; and any claim made for the specificity of any special therapeutic agent must be accepted with great caution.' Pellagra was recognized in the United States as 'a matter of great importance to the national public health' and approval was expressed of the interest displayed in this disease by the Public Health Service. The hope was expressed that 'the Congress of the United States may appropriate sufficient funds for the continuance and extension of this work.'"

Syphilitic Families.

The *Journal of the American Medical Association* for November 23, in its current literature columns, reports a study by Wolf of the family histories of nine syphilitic women. "Of the 66 pregnancies only 33 viable children were born, and 14 died in childhood; 3 committed suicide at the ages of 12, 20, and 28 years; two were epileptics, and one died after an abdominal operation; 13 are still living, but only two are normal. The others are all feeble-minded, epileptic, hysteric or with other nervous affections." This demonstrates the great share syphilis has in the development of nervous affections and degeneracy. "The data presented show further that the assumption of a nervous predisposition is untenable, for these same parents in later years, after recovery from the syphilis, were able to generate healthy children."

The Bacteriology of Influenza.

"The view that the influenza bacillus is a necessary factor in the production of this disease is steadily losing ground," says the *New York Medical Journal* (November 23, 1912). Many cases presenting the characteristic symptomatology fail to show the presence of the grip bacillus, while on the other hand that organism is found in conditions which fail completely to present the characteristic features of the disease. In a series of cases studied by Curschmann there were found the pneumococcus, the streptococcus and the staphylococcus, without the Loeffler bacillus, in forty-nine out of seventy-seven typical cases, the other bacteria existing in various combinations. There is, in fact, good ground for Leede's belief that "influenza is a symptom complex which may be evoked by different kinds of bacteria, the most prominent of which is the pneumococcus. Hence the need of always being on our guard against pulmonary complications in these cases."

Child Labor Laws.

William E. McKenna, in reviewing W. F. Ogburn's recent book on Child Labor Legislation for *The Public* (November 29, 1912), makes the following statement:—"While conditions are what they are, we shall need child labor laws and it is well to know what laws we have and what laws others have, so that we may improve ours by following the best examples. But to attack the child labor problem at the root we need the radical reforms that will enable the ordinary adult to support his family without the aid of his children." The reviewer gives from Professor Ogburn's book several interesting legislative curiosities, such as the statute which makes a fine of $50 the penalty for perjury, and the law in one or two states which exempts a child from night school, if he is not strong enough both to work and to attend night school.

Model Towns.

Although England is particularly fortunate in possessing several worthy examples of efficient town planning, such as Port Sunlight, Bournville and Letchworth Village, still another town is to fall in line, according to *Progress* for January, 1912. Middletown, a manufacturing center in Lancashire, with a population of 26,000 is the next community to endeavor to give pleasanter and healthier surroundings to the homes of its industrial workers. The estate selected is to be developed along co-partnership lines and several houses have already been constructed to show what can be done toward providing well-built, well-ventilated homes, pleasant to look at and good to dwell in, at a low cost.

A Modern Hospital.

"The city of Cincinnati is building what is expected to be the finest general hospital in the world. It will consist of thirty group buildings, eighteen of which have already been finished, all planned according to the latest ideas of hospital construction. The cost of the plant will approximate about $3,000,000." Thus a writer for the *New York Times* (December 1, 1912) speaks of the new Cincinnati hospital. The work is largely the result of the efforts of Dr. C. R. Holmes, who has agitated for a new structure for many years, and who was finally appointed to make a study of the equipment and construction of the best hospitals in Europe and in this country. A site was finally selected in the suburbs, and the buildings of the corridor-pavilion type erected. Each building is four stories in height and is in itself a complete hospital or ward unit, possessing a roof garden on the fourth floor and being capable of complete isolation, particularly in the case of the contagious group. Dr. H. T. Summergil, of New York City, an expert in this field, will be the superintendent of the new hospital. The *Times* article concludes that "when finished it will stand as a monument to the awakened public spirit of Cincinnati."

Consumptives' Hospital Schools.

"It was in January, 1911, that, according to Arthur Tracy Cabot in the *Atlantic Monthly*, the Boston Consumptives' Hospital trustees closed the home-school where children with open communicable tuberculosis were segregated." Says Mr. Cabot:—

"The chairman of the board, who cast the deciding vote which closed the school, when asked how these patients were to be cared for after the closure of the school, said, 'At day-camps and hospitals,' and declared that it was the intention of his trustees so to provide for them. Under these circumstances it is interesting to know what became of these patients after they were turned out of the hospital school. Drs. Locks and Murphy made an investigation and were able to trace one hundred and fifty-six out of the one hundred and seventy-four cases treated at the school during the year previous to its closure. Of these cases just nineteen or 10.91 per cent went to day-camps or hospitals; ninety-one, or 58.33 per cent went back into the public schools; four, or 2.56 per cent, had died; and the remaining forty-two patients, or 26.92 per cent, had gone back into the community.

"These figures give a striking illustration of the far greater usefulness to the community of a hospital school than of a day-camp or hospital. Only a little more than 10 per cent of the children whose parents are willing to have them attend a hospital school are willing to let them go to day-camps and hospitals. The large proportion of these cases which went back into the public schools, at the risk of infecting well children, is sufficient basis for a serious indictment of the city government that subjects well children, put under its care, to such unnecessary risks."

Survey, November 30, 1912.

Infant Mortality.

In the special report for 1912 of the New York Milk Committee there are discussed the conditions which most fundamentally affect infant mortality. Perhaps the chief of these is poverty, for this condition forces married women to work long hours of labor in unsanitary surroundings, and compels them to live in filthy, overcrowded tenements. The mother is forced by circumstances to artificially feed her infant, and to leave it in the care of neighbors or at the day nursery.

Ignorance is another powerful influence, for the uninformed mother knows nothing of clean milk or of proper feeding and the result, through bad methods of feeding and dirty milk, is the fatal diarrheal disease.

Poverty and ignorance, then, are the two great causative factors, though other agencies are mentioned by the Milk Committee, such as crime, and illegitimacy and summer heat. Illegitimacy is of some significance, for "the figures for England and Wales for 1909 show the death-rate among illegitimate children under one year of age to be 211.1 as against 104.8 for legitimate children—more than twice as high a mortality."

Cleveland's Open Air Schools.

That the open air schools have proved their worth in the battle against the "White Plague" is the conclusion one must reach after reading the article by J. C. Placak, M.D., medical school inspector of Cleveland, as printed in the October number of the *Cleveland Medical Journal.* Facts are presented which prove that the tuberculous and pretuberculous children are greatly improved both physically and mentally. The backward child is made to progress; the general health of nearly all is benefited; scholarship is improved; and there results a remarkable freedom from attacks of tonsilitis, choryza and bronchitis. The development of much tuberculosis is inhibited, some positive cases are cured, and purely from an economic standpoint the measure is justified by the saving of many thousands of dollars yearly to the community. The average gain in weight at one school during the winter was 4.7 pounds; at another school, 5.8 pounds; another 2.9 pounds; and still another 3.2 pounds. Of course, special provisions are made as to diet, the children being fed at 10 a. m., and 2 p. m., on milk, soups, bread, butter, jellies and cocoa. Suitable clothing is provided, consisting of heavy blanket suits, "lumber jack" stockings and felt-lined shoes. The results justify the work from an educational, as well as from a public health standpoint.

Septic Sore Throat.

Public Health Reports for November 22, 1912, in summarizing a report on the outbreak of septic sore throat in Baltimore, March, 1912, among other points, presents the following conclusions:—The outbreak was apparently a streptococcus infection. There were perhaps as many as 3,000 cases, with thirty or more deaths, and the method of dissemination in the epidemic was chiefly through the milk of one of the large dairies, probably augmented and prolonged by contact infection. The milk was probably infected previously to pasteurization and the infective agent survived the inadequate "flash" process employed at the time. As to the source of the infection the most probable hypothesis is that it was derived from the udder of some of the cows which produced the milk.

To quote the report further: "This epidemic can be satisfactorily accounted for only by the failure of the 'flash' system of pasteurization to pasteurize. It is believed that with the exception of the few days early in February, when the pasteurizer was out of operation, the pasteurization process used in the Baltimore dairy was conscientiously applied, and that reasonable precaution was used in the subsequent handling of the milk. The trouble lay apparently in the inadequacy of the process used. It is confirmation of the already widespread belief that the so-called 'flash' system of pasteurization is inefficient, as recently demonstrated by Rosenau and Schorer,[1] and that milk to be rendered safe must be held at a temperature of not less than 145°C. for at least 20 minutes, as recommended by the committee on milk standards appointed by the New York Medical Milk Commission."

Municipal Baby Incubators.

The *Medical Officer* for October 26, 1912, reports the consideration by the Oldham Health Committee of the use of baby incubators under municipal ownership and direction, for the rearing of premature, delicate or neglected infants. The question of the use of portable or non-portable ones was discussed, and it was decided that they would receive a fair amount of use. A resolution was finally adopted declaring for the purchase by the town of two inexpensive, portable incubators.

Economy, not Philanthropy.

"Business men are learning that well-fed, well-clothed, contented and happy men and women, working in well-lighted, well-ventilated quarters and on schedules arranged in accordance with modern knowledge turn out more work and better work than underpaid, discontented, over-worked help, working under uncomfortable and unsanitary conditions. In many places large corporations are to be found spending money liberally in playgrounds, rest rooms, libraries, gymnasiums, sanitary lunch rooms, moving picture shows, safety devices, ventilating systems and similar undertakings for the well-being and enjoyment of their employés; and this is not charity, but good common business sense."

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[1] Rosenau, M. J., and Schorer, E. H.: Tests of the efficiency of pasteurization of milk under practical conditions, *Journ. Med. Reseaich,* April, 1912, Vol. 26, pp. 127–158.

The Public Health Journal, Toronto, Ont., November, 1912.

Pellagra in New York State.

The September Bulletin of the *New York State Health Board* states that a few cases of pellagra have occurred in that state in the last year or two, one or two of which were in native inhabitants. The disease here is of recent origin, is apparently spreading northward and for these reasons health officers and physicians should become familiar with its manifestations. Two cases have been found in insane hospitals. The bulletin states that there is little evidence to lead to the consideration of the disease as a communicable one. It calls attention to the symptomatological "three D's" of pellagra, namely diarrhea, dementia and dermatitis. The diarrhea is associated with other digestive disorders; the dementia may be melancholia, manic-depressive insanity, neurasthenia, delirium, katotonia or an anxiety psychosis; the dermatitis occurs on the backs of the hands, neck and face, and is of an erythematous or vesicular character.

Trachoma in the United States.

"For some time it has been known that trachoma was present to a considerable extent among our Indians. Clark of the United States Public Health Service during the past summer found many cases on the reservations in Minnesota. These findings were deemed by the Minnesota State Board of Health to be of sufficient importance from a sanitary point of view to warrant the board in giving the matter the most careful consideration with a view of formulating plans for preventing the spread of the infection. Such action was clearly indicated for the protection of the commonwealth, trachoma being a communicable disease, mutilating in its effect, reducing markedly the efficiency of those affected, and, unless properly treated, ending frequently in blindness.

"Recently McMullen,[1] also of the Public Health Service, in an investigation of the prevalence of trachoma in eastern Kentucky, undertaken at the request of the Kentucky State Board of Health, found a most unlooked-for and surprising condition. McMullen carried on his survey in the mountain districts in Knott, Perry, Leslie, Breathitt, Lee and Owsley counties, and in the blue-grass country in Clark County. He examined in all 3,974 people, of whom 500, or approximately 12,5 per cent, were found to have trachoma. Of those examined, 2,796 were school children from the mountain counties, and of these 338, or approximately 12 per cent, had the disease. In Clark County, on the other hand, which is in the blue-grass country, and in which living conditions are quite different from those in the mountains, only fifteen cases of trachoma were found among 436 school children examined.

"The finding of a communicable disease of the nature of trachoma so prevalent in a community places it among the commonwealth's important public health problems. A locality cannot continue heavily infected with such a disease without constituting a serious menace to neighboring uninfected localities even more remote. It is probable, however, the conditions found in Kentucky do not exist in that state alone, but that investigation would show similar conditions present in the contiguous mountain regions of West Virginia, Virginia, Tennessee and North Carolina. McMullen suggests that measures to remedy the condition should be directed toward the prevention of the spread of the disease and the treatment of existing cases. At best, however, the problem is one that will take some time to bring to a satisfactory solution. It will require the utmost efforts of the authorities, assisted by the coöperation of the people."

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[1] McMullen, John: Trachoma in Kentucky, *Pub. Health Rep.*, November 8, 1912, p. 1815.

Editorial (in part) in *Journal of American Medical Association*, November 30, 1912.

Doctor Dowling Reappointed.

"Advices were received from Baton Rouge yesterday to the effect that Governor Hall has reappointed Dr. Oscar Dowling a member as well as president of the State Board of Health to succeed himself. Although this announcement has been anticipated for some time, it is none the less gratifying, as there exists a practically unanimous belief among the people that Dr. Dowling is the best equipped man to head the State Board of Health and that it would be a misfortune to lose his services until the campaign he has inaugurated against insanitary methods and conditions throughout the state has been thoroughly completed.

"Dr. Dowling, although he has served but a few years at the head of the Health Board, having been appointed to fill out an unexpired term, has been one of the most energetic and resourceful health officers the state has known. When he inaugurated his campaign to enforce more sanitary methods in all public restaurants, saloons, dairies, bakeries and other institutions handling the food of the people, there was much opposition from long established interests, but as the sanitary work progressed, and it was seen that it was no mere play to the galleries, but an honest and earnest effort to better conditions and protect the general public from insanitary surroundings, even the people that were originally the strongest opponents of Dr. Dowling applauded his energy and praised the results of his work.

"The appointment of Dr. Dowling to succeed himself reflects credit upon Governor Hall. In this case there can be no suspicion of any political motive nor desire to pay political debts. The governor found the control of the Board of Health in excellent hands and realized the importance of the great work Dr. Dowling had inaugurated, and he has accordingly reappointed him in the best interest of the entire state. No appointment yet made has been so eminently fit and proper, and the *Picayune* accordingly congratulates both Dr. Dowling and the governor, the first because he has received merited recognition and the other because he has made a wise and proper selection of the best man to supervise the state health affairs."

Daily Picayune, New Orleans, November 30, 1912.

Medical School Inspection.

Dr. E. W. Routley of Aldershot, England, is quoted in the *Medical Officer* for October 5, 1912, as declaring for the extension of the schedule of school inspection to include an examination for hernia. The defect is fairly common and is often overlooked, as the undressing of the child is not usually carried to the extent which would reveal its presence. The fear of the surgical operation almost certainly to be advised prevents many parents from mentioning the existence of a hernia, although in a few cases they have been known to call the doctor's attention to the abnormality. "In two cases accidentally brought to Dr. Routley's notice last year nothing would probably have been done in either case if they had not been brought to medical inspection. Both cases were, however, operated on and radically cured."

Health Reform in St. Louis.

The St. Louis Council of Civic Organizations, comprising eighteen bodies working for civic betterment, with a membership of 8,000, proposes to give energetic backing to five bills recently introduced into the municipal assembly, aimed at the protection of the public health. The *Survey* for November 30 gives the measures as follows:—

"For the wrapping of bakery products in clean paper.

"For the sanitary care of tenements, and for running water on each floor of such buildings.

"For the abolition of the 20,000 privy vaults in St. Louis, within five years.

"For regulation of the city's milk supply.

"For the proper heating and ventilation of street cars."

The details of the last bill are interesting. It provides that the air in cars must be changed six times an hour; that the air coming in through the inlets must be of a temperature of at least 60°, and that there must be maintained a temperature of not less than 55° in cars at all times.

As to the removal of the vaults it is planned to displace 4,000 a year and it is estimated that the cost of eliminating the entire lot will be about $1,500,000.

Continuation Industrial Schools.

"Thirty schools in Wisconsin have arranged for continuation schools in which industrial education will be the leading feature. This is the maximum number for which state aid was provided by the Legislature of 1911; other cities stand ready to establish such schools as soon as future legislative enactments shall entitle them to state aid. There has been raised by local taxation in the thirty cities $200,000, while the total state aid is limited to $35,000, and this speaks loudly of the faith of people in the value of providing for the educational needs of those whom the regular schools do not reach.

"As tersely stated by Warren E. Hicks, Assistant Superintendent for Industrial Education, 'Continuation activity is to get instruction in industry, not to get persons out of industry.' In addition to the industrial work, all continuation schools must give instruction in English, citizenship, business practice, physiology and hygiene and safety devices. Regulations have been made to prevent any interference on the part of industrial schools with the regular schools and vice versa. A child must have completed at least the fifth grade before he is permitted to attend a continuation school. Classes made up of part continuation school pupils and part regular school pupils are forbidden."

Wisconsin Educational News Bulletin, October, 1912.

An Innovation in Michigan.

"GONORRHOEA AND SYPHILIS *added to list of reportable diseases.* At the last meeting of the State Board of Health it was decided to place these diseases on the list of those to be reported by physicians to the local health boards and by the latter to the State Board of Health. Special regulation was made, however, that physicians need not report these cases by patient's name but by office number or some other symbol. This is taken to be a step toward more active efforts to restrict the spread of these diseases by instituting restrictive measures for those affected."

Public Health, October, 1912.

City Air Always Impure.

THE AIR OF LARGE CITIES IS ALWAYS IMPURE. Every breath inhaled contains damaging quantities of dust and germs. Some idea of the extent of uncleanness of city air may be gathered from the amount of soot which the air contains, although smoke products are perhaps the least injurious of the unwholesome things found in the air. It has been estimated that in the City of New York more than 145 tons of soot are annually thrown into the air by its countless smoking chimneys. Chicago produces nearly ninety tons annually, Philadelphia sixty tons, Pittsburgh, Cleveland, Boston and Detroit about twenty tons each. When we become a little more civilized we will insist upon the application of means to suppress this public source of air uncleanness."

Good Health Magazine, December, 1912.

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THE VALUE OF HUMAN LIFE.

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Read before the American Public Health Association, Washington, D. C., September, 1912.

Many attempts have been made to estimate the money value of human life, some of the most careful by members of this Association. The usual point of view is to consider that the money value of a life is represented by its value to its possessor, or to his family. Most hygienists count the money value of life in terms of earning power or wages. To the individual and his family his earnings are indeed the most urgent economic factor of life and it is natural that this viewpoint should be first in the minds of most of us. Though it does not take into consideration the very great economic importance of the non-wage-earning work of wives and other housekeepers, an estimate of wages lost by sickness and death does serve to illustrate the enormous dimensions and importance of the problems which the hygienists have to solve.

According to this view the capital value of a human life varies according to age, depending as it does on the two factors of earning capacity and expectancy of life. How much does a person earn and how long will he live? The answers to these questions will enable us to state how much he is worth. Years ago, Farr, in England, estimated that the new born babe of an agricultural laborer was worth $25 and figured out an increasing value up to middle life, after which the figures slowly declined. Fisher, assuming $700 as the average annual earnings of all workers in the United States, though he asserts, and probably correctly, that $1,000 is nearer the true figure, calculates that the value of a wage earner varies from $90 at birth to a maximem of $4,100 at 30 years, sinking again to $2,900 at 50. He further estimates, by using the census figures for age distribution, that the average economic value of the inhabitants of the United States is $2,900.

We are not, however, obliged to rely on *estimates* of earning power, Price has made a careful study of the earnings, and consequent loss to themselves by disability, of a large number of workers in Maryland, who were afflicted with tuberculosis. He found that the minimum, actual and potential loss, was nearly $3,000 and that maximum loss was $36,000 in the case of a woman 36 years old receiving a salary of $1,200.

Leighton has by another method figured the monetary value of life at different ages. His estimate is made by averaging the damages awarded by the courts for loss of life. His figures are for children under 5 years $1,500, a maximum for adults between 25 and 30 of $7,500, and a minimum of $1,000 at 70 years.

What a man earns indeed represents his money value to himself or to his family but according to some it is not a proper measure of his value to the community. According to Hoffman the economic gain to society is rather the value of the product over and above wages and the other costs of production. This Hoffman attempts to estimate from the census figures. He says: "It is probably safe to assume that the net gain to society is at least equivalent to about $300 per annum in the case of male wage-earners employed in American manufacturing and mechanical industries. Of course, the gain is less at the younger ages and probably remains fairly the same or level during the ages of 30 to 50, when the normal physical strength is enhanced by practical trade education and experience. The degree of variation in value may be placed between the minimum of $75 at the age of 15 and a maximum of $400 at the age of 32. If, upon a basis of average net gain to society of $300 per annum, the fifty active years of a workingman's life represents a total of $15,000, then if death should occur at the age of 25, the economic loss to society would be in round numbers $13,000; if at the age of 35 it would be $10,000; if at the age of 50, $4,400; and, finally, at the age of 60, the loss would still be $1,000." Nicholson apparently takes the same view and he estimates that the money value to the nation of a human life in England is towards $5,000.

If these estimates of the money value of a human being to his family or to society, be applied to the population of a country such as the United States, the figures reach enormous proportions and if we estimate the money loss which results from permature death, or disability from disease, or accident, the amounts are among the hundreds of millions or even billions. The public is told that a large amount of the disease causing these losses is preventable and that the money needed for prevention is only a tithe of the amount now lost. Increased appropriations for public health work are called for and it is usual to compare the small appropriations for the saving of human life with the large appropriations for the saving of hog life and to call attention to the fact that our cities commonly spend many times more on the fire department to protect property, than they do on the health department to protect health. In view of the tremendous money losses which it is alleged the community suffers, it is urged that this is a gross economic blunder. We are again and again told of the folly of refusing to spend the millions needed to prevent disease when this expenditure would yield a money return of hundreds of millions. Nevertheless our councils and our legislatures refuse to be greatly moved by these appeals and appropriations have generally shown no sharp advance. Why is it that this bargain is passed by?

Granting the estimates of our economists, and they are quite likely approximately correct, and granting that the health measures proposed will be effective, which is by no means certain, we may ask how does this viewpoint of the legislator and the taxpayer differ from our own, or what flaws are there in the business proposition which is being so zealously promoted.

As the extent and manner in which the burden of a tax is assessed and distributed determines in a large degree the attitude of the public towards that tax, so the distribution among the people of such losses as we are considering affects the attitude of the people towards measures intended for their prevention.

As regards the loss to the family from the cessation of the earnings of the sick or dead bread winner, if the family is thus compelled to receive public assistance *this* portion of the loss is distributed upon the whole community but the amount of such assistance is usually small as compared with the total loss of earnings concerning which so much is said. The greater part of the loss is not distributed and is not felt by the rest of the community, but is a burden upon the family alone, being met by economies and increased labor by other members of the family. Most legislators and taxpayers have seen concrete instances of the economic loss to the family from the death of the wage earner and the sorrow and suffering which it entails. It is by no means difficult to enlist their sympathies and to stir them to action by showing how such sorrow and suffering may be prevented. But it is a very different and much more difficult task to make the taxpayer believe that the losses of the bereaved family will fall on him, or that new wealth will flow to him by preventing the death of other wage earners. If his city is to spend money for sanitary improvements he knows that he will have to pay the tax. It is difficult to persuade him that even though a hundred lives are thereby saved each year, he will be one whit the richer. Is it not as easy to persuade a city council to spend a half a million for a filter, for the simple reason that it will prevent a hundred deaths a year, as it is to persuade them that this half million investment will yield $300,000 annually, of which tidy income each man will have his share. Most intelligent people suspect all schemes promising such excessive profits. Can we take the time to convince them of the genuineness of ours?

Let us turn now to the other view of the value to the community of the life of the worker as measured by the value of the product. Does not the wage earner believe that this value first appears as profits going to the employer of labor. No matter how generally this value may ultimately be distributed among the population, does not the wage earner feel that while that is no question about his paying his share of the tax imposed by sanitation, there is a good deal of doubt about his receiving any share in the profits? If he helps to save the lives of fellow-workers he may indeed see that more work will be done and more product result, but will he not feel that the product will go directly to the employer and not come to him? This brings us to another danger, which is likely to develop, if we insist too strenuously upon the cold-blooded method of calculating the value of life and health in terms of dollars and cents. The average wage earner, whether laborer or mechanic, believes in the law of supply and demand as affecting his wages. He sees that there is at most times and in most places, no marked dearth of labor. To most people it seems that there are more workers than jobs. It is easier to hire a man than it is to get a position. What will it avail our wage earners to increase their numbers by sanitation? It will take their money in taxes but how will they receive a return? Will not the increase in workers merely result in a decrease in wages, they may ask?

Now let us turn to the employers of labor, the class to which most of the large taxpayers belong. Do not they perhaps already hold to too great an extent the merely money view of the value of a human life. Are they not too prone to consider their employees as machines which yield them a profit and from which they strive to get the greatest possible product? In a very practical sense the value of a machine is measured by what it costs to replace it, not by the value of its products. It costs money to replace the machine of steel, but under present conditions it costs nothing, either to the employer or the community, to replace the machines of flesh and blood. New ones come to us from the ends of the earth and there is no interruption of the product. The employer usually finds no scarcity of labor. He is indeed rarely compelled to pay a bonus to procure employees. If there is need, in a short time help will come from Italy, from Syria, from Russia, and without cost to him or to the community in which he lives. The employer well knows that he must pay his share of the cost of better sanitation, and if he asks how and where he will receive into his pocket the pecuniary value of the lives to be saved, will we not have difficulty in instilling in him a living faith that his sanitary tax is a paying investment?

Under some circumstances the death of a human worker does mean a great and real financial loss. The experience of railroad and canal builders at Panama before the advent of Colonel Gorgas showed this. It was so evident that the federal government was willing to spend annually on a population of about 60,000 a sum approaching $2,000,000.* The canal will cost perhaps $300,000,000. If it had not been for Colonel Gorgas' work it would doubtless cost double that amount, if it could be built at all. This was certainly a good financial investment. It was so because without it labor on the Isthmus would have cost double or treble what it does. Who believes that if Brockton, Erie, Fort Wayne, Jacksonville, Harrisburg and Pawtucket, with about the population of the Canal Zone, should spend $2,000,000 annually on sanitation the benefits could be figured out in dollars and cents, and the taxpayers be made to feel that they individually would receive a money return for the expenditure.

Is it not probably true that one of the reasons why the community fails to be impressed by the startling financial loss attributed to the ravages of disease is that there is an instinctive feeling that from a money standpoint a human being is not a very valuable machine and that the replacement of one of these machines by another is not, under American conditions, a very serious drain on the community?

It is doubtless well that these estimates of the money value of life have been made. The message from the economists that the cost of prevention will be more than repaid is gladly heard by all broad-minded persons. Great numbers of people, however, look at these matters from a more personal standpoint. I would not defend these narrower viewpoints, some of which I have suggested in illustration, though they may not be wholly wrong, but I do believe that the broad statements as to losses by disease and gain through sanitation produce little impression on large numbers of persons. Let us not deal too long in glittering generalities. It is our duty as hygienists and health officers to be specific. We must measure more accurately the causes of disease; we must show more clearly the modes of prevention; we must demonstrate beyond question the efficiency of our methods; we must figure more carefully their cost and we must plan our expenditures so as to get the greatest possible results.

It is my belief that it is unwise to emphasize the financial side of the public health question in quite the way, or quite so much, as has been done of late. Life and health are cherished by all. It needs no argument to prove that it is good to be well and that it is wise to spend money for health. It is proper to consider cost in relation to results and financial savings, when such can be figured with accuracy, but there is much in the world which cannot be measured in terms of money, though to so measure it is doubtless the tendency of the age. Should we not place our profession on a higher level by resisting this tendency instead of yielding to it? Is it not dangerous to rely upon a balance sheet of life and death when there are so many chances of error in our calculations? Is it not enough to urge expenditures for the preservation of health because the happiness of mankind will be promoted thereby?

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* The whole of this amount ought not properly to be charged to sanitation, but, as they stand, the official figures show an enormous profit from the sanitary work.

MOSQUITO CATCHING IN DWELLINGS IN THE PROPHYLAXIS OF MALARIA.

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Assistant Chief Sanitary Inspector, Department of Sanitation, Isthmian Canal Commission.

Read before the American Public Health Association, Washington, D.C., September, 1912.

The purpose of this paper is to present for the consideration of sanitarians an anti-malaria measure extensively employed in the Panama Canal Zone, and one on which we have learned to place considerable reliance. This measure, in so far as I have been able to learn, is not applied to any extent elsewhere. I refer to catching Anophelines by hand within dwellings and in traps especially designed for this purpose. The only mention of this prophylactic measure that I have been able to find in literature, is that by Sir Ronald Ross, who, in his book "The Prevention of Malaria" states in Section 35, that Sir William MacGregor employed a boy to kill mosquitoes in his house in Lagos, in 1901.

The first systematic application of mosquito catching within habitations as a prophylactic measure against malaria, in so far as I have been able to learn, was made in the Canal Zone, in April, 1908, at a camp near Cocoli. The camp, composed of unscreened tents, was to be maintained only about five months, and it was not thought practicable to incur the great expenditure involved in a thorough anti-malaria campaign. When the camp was first established, as many as thirty Anophelines could be seen in a tent in the daytime, and many more after dark. One man was employed to kill the mosquitoes in these tents, He worked from 6.00 to 11.00 a. m., and from 1.00 to 5.00 p. m., daily. In the four and a half months of this camp's existence, the malaria incidence was a little over 1 per cent. per week. (LePrince in Ross' "The Prevention of Malaria.") This, despite the fact that the camp was surrounded by Anopheline breeding areas, where larvæ were abundant.

Another remarkable instance is described by LePrince in Ross' book cited above. In June, 1908, several hundred United States marines were quartered for about eight weeks on a hill near Panama known as Diablo Hill. During this period the malaria incidence among the marines was 14 per cent. a week. In May, 1909, some living cars were located on the same hill. The Anopheline breeding was just as it had been at the time the marines camped there. From the first week in May to the end of November in the rainy season, when malaria incidence is high in Panama, only four cases of malaria occurred among the forty laborers occupying these cars, a weekly incidence of about .3 per cent. The difference was due to having a man devote half an hour a day to the destruction of the Anophelines found in these cars, at a cost of five cents a day for the labor.

The most remarkable instance of the efficacy of Anopheles catching in the prophylaxis of malaria, is the case of the Monte Lirio Camps in the Canal Zone. During 1909, in the course of the construction of the new Panama Railroad, a number of construction camps were located in the jungle along the line of construction. Four of the largest of these camps, with an aggregate population of about 1200, were located along twelve miles of the railroad, at intervals of about three miles.

An anti-Anopheline campaign based on the installation of drainage, oiling, etc., that is to say, on measures directed against the propagation of Anophelines, would have been prohibitive in cost. It was therefore decided to house the employees in screened cars and to inaugurate systematic daily catching of mosquitoes within these cars. Very little was done in the way of attacking the breeding places of Anophelines with which the camps were surrounded. Anophelines were very abundant in these camps, the daily catch in the cars reaching several hundred. The malaria incidence in these camps, however, was practically the same as the average incidence for the Canal Zone, as is shown in the table on page 110; showing by months the malaria incidence for these camps and for the whole Canal Zone. In this connection it must be noted that the incidence for the camps is calculated on the basis of the provisional diagnosis made on admission to the hospitals, while the incidence for the whole Canal Zone is calculated on the diagnoses made on discharge. The provisional diagnoses show a somewhat larger number of cases of malaria than the final diagnoses;—the tendency in the Canal Zone is to err on the side of malaria in making a provisional diagnosis.

The technique employed in catching mosquitoes is as follows: A cylindrical glass vial about 4 1-2 inches long and 1 inch in diameter, such as is commonly employed by entomologists for collecting insects and which is obtainable at any druggist's supply house, is used.

Into the bottom of the vial are placed some ordinary rubber bands cut into short lengths and packed into a layer about an inch thick. On top of this is placed a small plug of cotton to keep the rubber in place. A few c.c. of chloroform is now poured into the vial and a strip of paper loosely packed on top of the cotton in such a manner as to retain in the vial the killed mosquitoes without allowing then to become entangled in the cotton. The vial is corked with an ordinary cork.

Of course, it would be possible to charge this vial with potassium cyanide imbedded in plaster-of-paris, but with the low grade of labor we are compelled to employ, we prefer not to use cyanide.

In addition to the chloroform vial, the mosquito catchers are also equipped with an ordinary "slapper" made of a six-inch square wire gauze attached to a two-foot stick.

Equipped with a "slapper" and chloroform tube, the mosquito catcher enters various dwellings and searches for mosquitoes. A few days of instruction suffice to teach even the decidedly stupid West Indian negro laborer how to find and destroy mosquitoes. The mosquito catchers are instructed to kill all mosquitoes they see, so that in addition to Anophelines other species are also destroyed. With a little experience, it is comparatively easy to catch with a chloroform tube mosquitoes resting on solid objects, especially is this true of the Anophelines, which are not very easily frightened away. During the day the Anophelines seek dark places, such as the corners of rooms, recesses behind pictures, clothing, etc. They also apparently prefer to rest at a height not exceeding six feet from the floor. Early in the morning and in the dusk of the evening, however, Anophelines are quite commonly seen on the inside and outside of the screening on windows, doors and verandas. It is on the Anophelines resting on screening that the slapper is used, since the chloroform bottle is not very effective in these situations.

The method of using the chloroform vial is of course very simple. The collector having spied an Anopheline uncorks his vial and gently but rapidly places it over the insect. In a moment the chloroform fumes overcome the insect and it drops into the tube.

In the search for Anophelines an electric torch, or an incandescent lamp attached to a long cord, or a lantern—although the latter is not desirable because of the danger of fire—is of great assistance, as it is somewhat difficult to see a mosquito resting on an object which may be very near its own color. Where it is contemplated to carry out systematic Anopheline destruction in habitations, the interiors should be painted a very light color, so as to facilitate the work of the mosquito catcher. This is very important. In two camps on the Canal Zone slate colored interiors have so hampered the work of the mosquito catchers that practically no mosquitoes were destroyed. Repainting the interiors a light green immediately resulted in greater number of Anophelines caught.

The early morning and evening hours are the most favorable for hunting Anophelines in houses, and, in so far as possible, dwellings should be visited by the mosquito catchers before sweeping, etc., has been commenced, this process tending to disturb the Anophelines and drive them into recesses where they cannot be seen nor reached.

In addition to catching mosquitoes by hand, a trap designed by one of the sanitary inspectors on the Canal Zone, Mr. C. H. Bath, has been employed to a considerable extent, and has proven quite efficacious. The trap is constructed on the principle of the ordinary funnel fly trap, extending into the form of a semi-cylinder, with two ridges inside of it, the apeces of which are perforated by longitudinal slits about ¼ inch wide and 3 inches long. Through the slits in these ridges the mosquitoes enter the chamber of the trap and cannot, for some reason, find their way out again.

The traps may be installed to catch mosquitoes as they endeavor to gain admittance into the building, or when they endeavor to leave. In the first case, the opening of the trap is turned outward, and in the second, inward. The place in which the trap is fastened is of considerable importance and should be determined by experiments in each locality, as there seems to be considerable difference in the flight habits of the various genera of mosquitoes. In the Canal Zone more Anophelines are caught in a trap installed on the lee of buildings, and more Culicines in traps installed on the windward side of buildings. The traps should be installed in such a manner that their daily detaching for the purpose of subjecting the insects within the traps to the action of some insecticide, such as the fumes of sulphur or pyrethrum, may be easily accomplished. After the insects have been killed, the trap is opened and the contents removed.

In addition to catching mosquitoes, and thus reducing the chances of attack upon the inmates of the dwelling, as well as catching mosquitoes that have bitten an infected person before the plasmodia of malaria has had a chance to mature within the mosquito, the trap may be made to serve other purposes; it may be used, for instance, to establish an Anopheline index for a given locality.

The mosquito trap may also be employed in insect work in other fields which are, however, foreign to the purpose of this paper.

When it is remembered that in malaria a period of at least one week must elapse before the mosquito which has fed on an infected person can transmit the infection to another person, and when it is recalled that an Anopheline filled with blood becomes sluggish and does not fly very far for some time, the efficacy of killing mosquitoes within habitations becomes self-evident.

When the work was first undertaken in the Canal Zone, it was not believed that it could be successfully carried out, because it was thought improbable that any but highly trained men could find and kill Anophelines in sufficient numbers to accomplish any good. Experience, however, has proven otherwise. Unlettered West Indian negro laborers at a compensation of ten cents an hour, the lowest wage paid in the Canal Zone, are employed in this work, and, with very little training, do it in an entirely satisfactory manner.

SUMMARY.

Catching mosquitoes by hand within dwellings is a measure of great value in the prophylaxis of malaria. It is especially applicable to temporary camps.

If the dwellings are screened the catching should be done early in the morning and in the evening. If the dwellings are not screened and the Anophelines are abundant, a search for Anophelines should be made four or five times a day.

In order that the catching may be efficiently done, it is necessary to have the dwelling well lighted and the walls painted a light color or whitewashed. In dark dwellings some form of portable illumination should be used.

In screened buildings hand catching may be supplemented by properly designed and installed mosquito traps.

TABLE OF MALARIA INCIDENCE.

Months.	1909.		1910.		1911.		Remarks.
	Construction Camps.	Entire Zone.	Construction Camps.	Entire Zone.	Construction Camps.	Entire Zone.	
January			1.55%	.96%	.67%	.72%	Dry Season.
February			.67%	.71%	.42%	.77%	Dry Season.
March			1.44%	1.04%	.28%	.85%	Dry Season.
April			2.50%	.81%	.56%	.68%	Dry Season.
May			2.30%	1.16%	1.94%	1.91%	Rainy Season.
June			2.41%	2.42%	5.06%	3.59%	Rainy Season.
July			3.29%	3.39%	2.84%	4.14%	Rainy Season.
August			1.34%	2.81%	1.36%	1.82%	Rainy Season.
September			.96%	1.76%	2.64%	1.40%	Rainy Season.
October			2.59%	1.25%	2.58%	1.00%	Rainy Season.
November			.50%	1.16%	2.58%	.82%	Rainy Season.
December	.94%	1.50%	.77%	1.16%	1.21%	.76%	Rainy Season.
Average per month	.94%	1.50%	1.53%	1.55%	1.84%	1.54%	

I am indebted to Col. W. C. Gorgas, Chief Sanitary Officer, Isthmian Canal Commission, for permission to contribute this paper.

PUBLIC HEALTH SERVICE NOT A MEDICAL MONOPOLY.

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Read before the Sanitary Engineering Section, American Public Health Association, Washington, D. C. September, 1912.

The formation of a Sanitary Engineering Section in the American Public Health Association is an important and progressive step from many points of view. Not the least of these is the official recognition thereby given of the interest and value in public health work of professional men other than physicians. This paper is presented with a view to emphasizing this feature, and affording opportunity for a discussion of whether such recognition ought not be extended to the abolition of the apparent monopoly of public health service still legislatively maintained for medical men in most of the states. In such a paper it would be impossible to avoid references to specific examples in certain states. It should be borne in mind, however, that where this is done, it is solely for the value of the example as illustrative of the subject under discussion, and not with any desire to criticise any person or locality.

The present situation is but a natural outgrowth of sanitary history; for, in the beginning, it was medical men only who understood anything of the nature, cause, course and character of disease. Moreover, early sanitary work was confined largely to isolation, treatment, disinfection and fumigation at the focus of infection. It was but natural, therefore, that early public health laws should have required that the services of physicians be secured for administering the measures necessary to safeguard the health of the people. It is a superb example of the altruism of the medical profession that, in public service, private practice and scientific research, it has met these demands with such a fine spirit, and so successfully, that to it, to a great extent, is due the noble structure of modern sanitary science, as it exists today. Tribute should unstintedly be given to such professional self-sacrifice, in decreasing the ravages of these ills, the attendance upon which constitutes the chief source of income. It must not be forgotten, however, that the greatest contribution of all, the foundation upon which modern sanitary science is built, was made by Pasteur, a chemist and mineralogist, who had no medical training.

The development of sanitary science by medical men and their fellow-workers has given the world a new conception of disease and its prevention. It has been shown that infection really does mean "a making into from without," and the environmental nature of the cause of many of the diseases has become firmly established.

As a result, medical service, strictly speaking, has become a relatively lessened portion of the modern health organization's activity. The control of the environment has become of even greater importance, as a sanitary measure, than personal precautions at the bedside; for, with the growth of city life, the former may directly affect thousands or even millions, while the latter offer direct protection but to a few individuals. The value of medical men in public health work has remained and has even increased with the development of sanitary science and the growth of specialization; but alongside of him important places have been made for the engineer, the chemist, the bacteriologist, the demographer and the sociologist.

Educational institutions, responsive to new standards and new public needs, are now training men especially for every branch of this new public health service. Courses in Sanitary Engineering, like that of the Massachusetts Institute of Technology, the Harvard Graduate School of Applied Science, the Universities of Illinois, California and Pittsburgh, and many other universities of this and foreign countries; courses in Sanitary Chemistry, Bacteriology, Sanitary and Vital Statistics, Economics and Sociology: all these are constantly training men for the various technical services of public health work in a manner that is unquestionably superior to the training offered by any medical course. For the broader service required of health officers and for the administration of public health work the courses in public health, leading to such degrees as Doctor of Public Health, and the diploma in public health, at Harvard Medical School, University of Pennsylvania, Universities of Manchester, Liverpool and Edinburgh, and other institutions, are in a like manner superior to the medical training. It must be generally agreed, therefore, that there is no longer a scientific basis for continued legislative restriction of the public health service to any one profession.

If this is true of the technical services of public health work and for the administration of local public health measures, its truth is all the more apparent in such an organization as a State Board of Health, where, in addition to the control and supervision of all these technical services, the members are charged with the administration of an important portion of the police power of the sovereign state, and are thrown in contact by their actions with constitutional rights of individuals and communities. It is all important that the administrators of the State Board of Health work shall be broad gauge publicists, humanists, men of wisdom, deliberation, judgment, and administrative ability. Detail technical work may be left to trained assistants; and this is admirably provided for in many states by authorizing the appointment, at attractive recompense and with large responsibilities, of engineers, chemists, bacteriologists, doctors, statisticians and others.

Some of these principles were recognized so clearly by the wise, far-sighted Sanitary Commission of Massachusetts, over sixty years ago, that they cannot be better expressed today than in the words of some portions of its report. In speaking of the constitution of the State Board of Health, which was proposed, it says:—

> We recommend that the Board, as far as practicable, be composed of two physicians, one counsellor at law, one chemist, one natural philosopher, one civil engineer, and two persons of other profession or occupation; all properly qualified for the office by their talent, their education, their experience and their wisdom. . . . The members should not be selected exclusively from one profession, for two reasons:—1. Numerous questions requiring a knowledge possessed by different professions will be presented for discussion and decision; and it is desirable that the Board should be able to bring competent knowledge to the investigation of every subject. 2. To show to all that the promotion of public health is a matter which does not belong exclusively to the medical profession, but concerns every profession and every person. The idea which too generally prevails, that everything relating to health belongs exclusively to one profession, operates against sanitary improvement. The services of medical men are indispensable; but the services of other professions, and of every person in their respective spheres, must be put in requisition, before reform can be complete. . . .
>
> All should make themselves thorough masters of the objects of their appointment; have sagacity and foresight to perceive the bearing and effect of every measure proposed; be eminently practical men, wise in deliberation, and judicious in decision.

With similar breadth and wisdom the recommendation regarding the Executive Officer of the Board took the following form:—

> We recommend that the Board be authorized to appoint some suitable and competent person to be the Secretary of the Board, who should be required to devote his whole time and energies to the discharge of the duties of his office, and be paid a proper salary for his services. . . .
>
> He should be amply qualified, in all respects, for the office; know what to do, and how to do it, and what information to obtain, and how to obtain it. He should be thoroughly educated in the science of public health, and the causes and prevention of disease; and be capable of arranging, analyzing, abstracting, combining, and publishing the facts that may be collected, with proper deductions and conclusions from them, in such form as will be most useful to science, and contribute most to the improvement of practical life. To discharge the duties of such an office in such a manner as they might and ought to be discharged, would, in our judgment, be enough to satisfy the desires of any man who wished to be honored and useful.

This report is one of the most enlightening documents and shows a thorough vision of sanitary science as we understand it today, even before many of the truths now known were demonstrated; it should be in the hands of every student of public health questions. There are a number of other things of such interest and importance that I shall take the liberty of quoting from several passages somewhat at length. It is stated in the early part of the report, as follows:

> We believe that conditions of perfect health, either public or personal, are seldom or never attainable; . . . and that measures for prevention will effect infinitely more than the remedies for disease.

Again, quoting from Hippocrates, "the Father of Medicine," to show that environment is a large factor in the spread of disease, as follows:

> When asked, "Who is the physician that is an honor to his profession?" he replied, "He who has merited the esteem and confidence of the public, by profound knowledge, long experience, consummate integrity; who has been led through the whole circle of the sciences; who has a due regard to the seasons of the year, and the diseases which they are observed to produce,—to the states of the wind peculiar to each country, and the qualities of its waters; who marks carefully the localities of towns, and of the surrounding country, whether they are low or high, hot or cold, wet or dry, who, moreover, neglects not to mark the diet and regimen of the inhabitants, and, in a word, all the causes that may produce disorder in the animal economy."

The Commission also quotes from Doctor Duchatelet, an eminent member of the Council of Health at Paris, with regard to the qualifications of officers of public health, as follows:

> It is generally thought in the world that the medical knowledge acquired in the schools is all that is necessary to become a useful member of the Council of Health. The greater part of medical men themselves share this opinion; and, on the strength of some precepts which they have collected from books on health and professions, they think themselves sufficiently instructed to decide on the instant the gravest questions, which can only be resolved by special studies. . . . To be really useful in the Council, it is necessary to have an extended knowledge of natural philosophy; to know with exactness the action which trades may have on the health of those who exercise them, and the much more important action of manufactories of every species on men congregated in towns, on animals, and on plants. . . . From what has been said, the necessity will be evident to introduce into the Council those physicians who have made health, and particularly the public Health, a special study; and to join with them chemists, and, above all, manufacturing chemists and other professions.

Again they quote from an article on the Board of Health of England, in the *Edinburgh Review*, for January, 1850, as follows:—

> We believe that some not unnatural jealousy has been felt by the medical profession, as to the constitution of the Board; but we cannot regret the circumstance that its chief operative leader is not a physician. It is very necessary that such a department should have the best scientific counsel and assistance that the country can afford . . . but, on the other hand, it seems indispensable that an administrative body, coming in contact with constitutional rights and responsibilities, should have another kind of leadership. To balance the heroism and disinterestedness, for which we most willingly give them credit, the medical body have some defects, especially in their jealousies and prejudices. . . . Nor is it uninstructive to remember that, though they have liberally responded to it, the idea of sanitary reform, on the scale which we are now considering, did not *originate* within the medical profession. And, in truth, the constant direction of the faculties to the cure of actual disease, does not seem likely to leave much observation to devote to the study of its external causes.

Some other of the recommendations to show an appreciation of environmental causes are:—

> We recommend that, in laying out new towns and villages, and in extending those already laid out, ample provision be made for a supply, in purity and abundance, of light, air, and water; for drainage and sewerage, for paving, and for cleanliness.
>
> We recommend that local Boards of Health, and other persons interested, endeavor to ascertain, by exact observation, the effect of mill-ponds, and other collections or streams of water, and of their rise and fall, upon the health of the neighboring inhabitants.
>
> We recommend that the local Boards of Health provide for periodical house-to-house visitation, for the prevention of epidemic diseases, and for other sanitary purposes.

Again, they quote from the weekly summary of the Public Health, issued by the Registrar General in the midst of the cholera epidemic of 1849, as follows:

> No city, perhaps, ever possessed such an efficient body of medical men as are now practising in London. . . . Nearly all the sick have been seen by these practitioners, yet 14,500 persons have already died of cholera in London. How is this? The medical force will be found to have been employed at an immense disadvantage. It is called into action at the wrong end of the malady. Inquiries prove, that while medical advice is generally sought in the characteristic stage, it is seldom obtained in the premonitory stage, when the power of medicine is decisive; and to that earlier and still more important period preceding the premonitory stage, which is prevented as easily as cured, medical practice has had little or nothing to say. Cholera here, also, only shows in high relief what exists in ordinary circumstances. Medical men rarely if ever treat the beginnings of diseases, and are scarcely ever consulted professionally on the preservation of the health of cities or families. The art of preserving health is taught in no regular course of lectures at any of the great schools of medicine in the United Kingdom. . . . In the science of health there are more exact, demonstrable truths than in the science of disease; and the advantage of "prevention" over "cure" requires no proof. In the Cyropœdia of Xenophon, physicians who only treat the sick are compared to "menders of torn clothes," while the preservation of health is declared a noble art, worthy of Cyrus himself.

It is fortunate, indeed, that not only has the general public advanced today far beyond this stage, but physicians have led in teaching that *prevention* is better than *cure.*

Sanitary education, already mentioned as occupying an important part in present-day institutions, was wisely and strongly urged in another recommendation of the same Commission, as follows:

> We recommend that persons be specially educated in sanitary science, as preventive advisers as well as curative advisers. . . . Sanitary professorships should be established in all our colleges and medical schools, and filled by competent teachers. The science of preserving health and preventing disease should be taught as one of the most important sciences. It would be useful to all, and to the student in curative medicine as well as to others. To the young man who is educating himself for the great purposes of life, whatever profession he may select, it cannot be inferior, in interest and importance, to any other branch of education.

Today we have in some states advanced even beyond the point of view of the Massachusetts Sanitary Commission, and Massachusetts, Ohio and several other states, with the simple requirement of "seven or nine persons," to be appointed to the State Board of Health, lead in the democracy of this service. Where some restriction is considered desirable, New York has given an admirable model, in requiring that the commissioner of public health shall be "of skill and experience in public health duties and sanitary science,"—although the additional restriction that he shall be an experienced practising physician appears less advantageous. Some states, notably Massachusetts, New York, Pennsylvania and Ohio, have taken an advanced stand, more by practice than because of definite legislative enactment, in recognizing the wisdom of having a competent engineer in charge of an important branch of the service.

Many of our states, however, still lag behind and retain on their statute books requirements inherited from the days before the dawn of modern sanitary science. The appendix shows a tabulation of the legislative enactments, as found in the latest copy of the state laws, relating to eligibility for appointment or election to the State Board of Health, and to the position of executive officer of the State Board of Health, in all states of the Union. For convenience this table has been confined to state service, but an examination of any of the local health service laws shows the same restriction and the same lack of uniformity.

A study of the table indicates that a considerable majority of the states still require that some or all of the members of the State Board of Health, and the state health officer, shall be physicians, and brings out the following facts:

In fifteen states all members of the state boards of health (leaving out one or two ex-officio members, as governors and attorney generals, in a few cases) are required to be physicians. Twenty-three states require one or more, but not all members of the state board of health to be physicians. In ten states there is no professional requirement for eligibility.

Stating this in another way, and excluding Alabama and South Carolina, where the State Medical Associations are the state boards of health, out of 298 members of state boards of health the eligibility requirements are as follows:

	172	must be physicians;
	7	must be engineers;
	1	must be lawyer;
	1	(preferably) lawyer;
	1	must be live stock breeder;
	8	Attorney-Generals ex-officio;
	4	Governors ex-officio;
	1	State Veterinarian ex-officio;
	1	Commissioner of Agriculture ex-officio;
	1	State Engineer ex-officio;
	1	Commissioner of Education ex-officio;
	100	No requirements.
Total,	298	

Out of 46 executive officers of state boards of health (variously called commissioners, secretaries, superintendents, presidents and state health officers) 32 must be physicians and 14 have no such requirement.

It should be said, however, that the medical profession, as an organization, is not responsible for this. In 1871, only two years after the establishment of the first State Board of Health in this country, the American Medical Association, in convention at San Francisco, adopted resolutions memorializing the legislature of each state, urging the establishment of a State Board of Health, and recommending as a model the Massachusetts plan of having seven appointive members, not necessarily all physicians.

Alabama, the first in the alphabetical roll of states, will be given more detailed consideration for the sole reason that it is believed to represent the best example of the medical monopoly fallacy carried to its ultimate limit. Under the present law in Alabama, first enacted in 1875, and amended several times since, the Alabama Medical Association is legally constituted the State Board of Health. This association, with a membership of over eighteen hundred physicians, meets once a year and elects an executive officer, known as the state health officer, who, with the State Committee of Public Health (the Board of Censors of the Medical Association) supervises and directs the administration of the public health laws of the state, during intervals between meetings of the association.

The County Medical Associations are legally constituted County Boards of Health, and no other local boards of health are permitted. The county boards elect the county health officer, and the health officer for each incorporated city and town. The county health officer is eligible for election as health officer of any one or more cities or towns.

To understand fully this plan of organization, a knowledge of the organization of the State and County Medical Associations is necessary. All the officers of the State Association, including the state health officer, must be chosen from the college of Counsellors. The membership of this body is limited to one hundred, exclusive of "Life Counsellors," who have served as counsellors for twenty years. Some of the requirements for eligibility as counsellor are five years membership in the association, and "fidelity to the system of organization embodied in this Constitution."

Counsellors, to fill vacancies, and all officers (except the state health officer) are nominated by a nominating committee, which must be composed of "Senior Counsellors," who have served as counsellors for ten years. Elections and all formal actions of the association, are by vote of the counsellors and the delegates. Each County Medical Society (whatever its membership) is entitled to two delegates, who are not eligible for office or appointment to the nominating committee. Members cannot vote or hold office. Counsellors hold their position "until removed by death, resignation, impeachment, or neglect of duty."

A board of censors, consisting of ten counsellors, nominated and elected as are other officers, acts as a general commitee of the association, and as the state committee of public health. It elects the state health officer, subject to confirmation by vote of the counsellors and delegates. It is also the State Board of Medical Examiners. Meetings of the association are held annually, and amendments to the constitution must be presented at one annual meeting, and cannot be voted on until the next.

The County Medical Associations are organized along similar lines, except that there are no counsellors or delegates, election being by open ballot. A board of censors, of five members, each elected for five years, acts as a general committee for the association, and as a county committee of public health.

Narrowness of scope; incompleteness of work from the broader sanitary point of view; emphasis on *cure* rather than *prevention;* and insufficient realization of the importance of reliable statistics may well result from so remarkable and oligarchical plan of organization. It is believed that every state would benefit by removing the restriction of the public health service to the medical or any other profession, and by securing the men best qualified by training, experience, wisdom and judgment; as determined by civil service, record of public service and practical achievement, by responsible appointment, and by other suitable means. It is hoped that this presentation will stimulate a discussion upon this important subject of public policy.

APPENDIX.

STATUTORY PROVISIONS REGARDING ELIGIBILITY AND SELECTION OF MEMBERS AND EXECUTIVE OFFICERS OF THE STATE BOARDS OF HEALTH, IN THE SEVERAL STATES.

State.	State Board of Health.			Executive Officer (President, Secretary or Commissioner).		Remarks.
	Number.	Eligibility Requirement.	How Chosen.	Eligibility Requirement.	How Chosen.	
Alabama		Alabama Medical Association is constituted State Board of Health.		Must be counsellor of association and therefore physician.	Elected by board of censors.	Board of Censors of ten acts as State Committee of Public Health.
Arizona	3	One (secretary) must be physician. Governor and attorney-general, ex-officio.	One appointed by governor.	Must be physician.	Appointed by governor.	
Arkansas	7	All must be physicians of different medical schools.	Appointed by governor.	Must be physician.	Appointed by board.	Board advisory in function.
California	7	Must be physicians.	Appointed by governor.	Must be a member of board and therefore physician.	Elected by board.	
Colorado	9	No requirement.	Appointed by governor.	No requirement.	Elected by board.	
Connecticut	7	Three must be physicians; one must be lawyer.	Six appointed by governor; one (secretary) elected by others.	No requirement.	Elected by other members.	
Delaware	7	Must be physicians.	Appointed by governor.	No requirement. See remarks.	Elected by board.	Secretary may be member of board.
District of Columbia.				Must be physician.	Appointed by Commissioners of district.	
Florida	3	No requirement.	Appointed by governor.	Must be physician.	Appointed by board.	
Georgia	12	Majority must be physicians.	Eleven appointed by governor. One (secretary) elected by appointees.	Must be physician.	Elected by other members.	
Idaho	5	Three must be physicians. Attorney-general and state engineer, ex-officio.	Two appointed by governor; one elected by other members.	Must be physician.	Elected by other members.	
Illinois	7	No requirement.	Appointed by governor.			
Indiana	5	One (secretary) must be physician.	Four appointed by Board of Appointment; one (secretary) elected by appointees.	Must be physician.	Elected by other members.	

APPENDIX—*Continued.*

State.	State Board of Health.			Executive Officer (President, Secretary or Commissioner).		Remarks.
	Number.	Eligibility Requirement.	How Chosen.	Eligibility Requirement.	How Chosen.	
Iowa	10	Seven must be physicians; one must be civil engineer; attorney-general, and state veterinary surgeon, ex-officio.	Eight appointed by governor.	Must be physician.	Elected by board.	
Kansas	10	Nine must be physicians; one, preferably attorney.	Appointed by governor.	No requirement.	Elected by board.	
Kentucky	8	Must be physicians.	Seven appointed by governor; one (secretary) elected by other members.	Must be physician.	Elected by other members.	
Louisiana	7	Must be physicians.	Appointed by governor.	Must be member of board.	Designated by governor.	President is executive. There is also a secretary, not a member of board.
Maine	7	No requirement.	Six appointed by governor; one (secretary) elected by other members.	No requirement.	Elected by other members.	
Maryland	7	Four must be physicians; one civil engineer. Attorney-general and Baltimore commissioner of health, ex-officio.	Three physicians and engineer appointed by governor. One (secretary) elected by other members.	Must be physician.	Elected by other members.	
Massachusetts	7	No requirement.	Appointed by governor.	No requirement.		
Michigan	7	No requirement.	Appointed by governor.	Must be member of board.	Elected by board.	
Minnesota	9	Must be learned in sanitary science.	Appointed by governor.		Elected by board.	Secretary may or may not be member of Board.
Mississippi	13	Must be physicians.	Appointed by governor. Five on recommendation of State Medical Association.	Must be member of board, therefore physician.	Elected by board.	Mississippi State Medical Association and all other State, County and District Medical Societies affiliated with its purposes are styled "State Department of Health."
Missouri	7	Five must be physicians.	Appointed by governor.			
Montana	7	Four must be physicians; governor, state veterinarian, and attorney-general, ex-officio.	Three physicians appointed by governor; one physician (secretary) elected by other members.	Must be physician.	Elected by other members of board.	

Nebraska	7	Four must be physicians; governor, attorney-general and superintendent of public instruction, ex-officio.	Four appointed by governor.	Four secretaries must be physicians.	Appointed by governor.	
Nevada	3	Two (president and secretary), must be physicians.	Two (president and secretary), appointed by governor. One appointed by governor, president and secretary.	Must be physician.	Appointed by governor.	
New Hampshire	6	Three must be physicians; one must be civil engineer: governor and attorney-general, ex-officio	Four appointed by governor.	Must be physician.	Elected by board.	Secretary may be a member of board.
New Jersey	6	One (secretary) must be physician.	Appointed by governor.	Must be physician.	Designated by governor.	
New Mexico	7	Must be physicians.	Appointed by governor from list furnished by New Mexico Medical Association.			
New York				Must be physician.	Appointed by governor.	"Of skill and experience in public health duties and sanitary science."
North Carolina	5	Four must be physicians; one must be sanitary engineer.	Physicians elected by North Carolina State Medical Association. Engineer appointed by governor.	No requirement.	Elected by board.	
North Dakota	3	No requirement.	Appointed by governor.	No requirement.	Appointed by governor.	
Ohio	8	Attorney-general ex-officio.	Seven appointed by governor.	No requirement.	Elected by board.	
Oklahoma				No requirement.	Appointed by governor.	
Oregon	7	Must be physicians.	Six appointed by governor. One (secretary) elected by other members.	Must be physician.	Elected by other members.	
Pennsylvania	6	Majority must be physicians. One must be a civil engineer.	Appointed by governor.	Must be a physician.	Elected by board.	Board advisory in capacity. Executive officer is commissioner.
Rhode Island	8	Five must be physicians.	Seven appointed by governor. One (secretary) elected by other members.	Must be a physician.	Elected by other members.	

APPENDIX—*Concluded.*

State.	State Board of Health.			Executive Officer (President. Secretary or Commissioner).		Remarks.
	Number.	Eligibility Requirement.	How Chosen.	Eligibility Requirement.	How Chosen.	
South Carolina......		South Carolina Medical Association with attorney-general and comptroller-general constitute State Board of Health. Represented between meetings by executive committee.		No requirement.	Appointed by governor on recommendation of executive committee.	Executive committee consists of seven physicians, appointed by the governor on recommendation of the Medical Association, together with the attorney-general and the comptroller-general, ex-officio.
South Dakota.......	5	Must be physicians.	Appointed by governor.		Elected by board.	
Tennessee..........	5	Three must be physicians. One must be a livestock breeder. State commissioner of agriculture, ex-officio.	Four appointed by governor.	Must be a physician.	Elected by board.	
Texas.............	7	Must be physicians.	Appointed by governor.	Must be a member, therefore physician.	Designated by governor.	
Utah..............	7	Majority must be physicians. One must be a civil engineer.	Appointed by governor.			
Vermont...........	3		Appointed by governor.	Must be a physician.	Elected by board.	
Virginia...........	12	Must be physicians.	Appointed by governor.	"Shall be versed in bacteriology and sanitary science."	Appointed by governor.	
Washington.........	5	No requirement.	Appointed by governor.	Must be physician.	Elected by board.	Secretary may or may not be member of board.
West Virginia.......	10	Must be physicians.	Appointed by governor.	Must be member of board.	Elected by board.	
Wisconsin..........	7 or 8	No requirement.	Seven appointed by governor.	No requirement.	Elected by board.	Secretary may or may not be a member of board, but if not becomes so on election.
Wyoming..........	3	One (secretary) must be a physician.	Appointed by governor.	Must be a physician.	Appointed by governor.	

NOTE.—Eligibility requirements refer only to professional requirement, if any; thus, "no requirement" does not mean that there may not be some requirement regarding geographical distribution of appointments, etc.

A PLEA FOR A MORE GENERAL RECOGNITION OF THE QUALIFICATIONS OF THE SANITARY ENGINEER FOR ADMINISTRATIVE PUBLIC HEALTH WORK.

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Read before the Sanitary Engineering Section, American Public Health Association, Washington D. C. September, 1912.

The rapid increase in knowledge relating to public health matters in general during the past few years has brought about a new condition of affairs in health board administration that is only just beginning to receive the recognition that must eventually be given to it by state and local health boards. Until very recently practically the only real work of the majority of health boards was the supervision of cases of and the suppression or attempted suppression of epidemics of communicable diseases. In fact, many health boards apparently believed that this was their only function and that this function related only to the direct, personal-contact phase of the matter and not to the various indirect means by which diseases may be spread.

In view of this apparent attitude towards the work that fell to health boards it was only logical that the executive officer should be chosen from the ranks of the medical profession. At the present time it is the law in many communities that the health officer shall be a physician. The inconsistency of a law of this kind is apparent when we consider for a moment the complexity of the work undertaken by an active, up-to-date health board. In addition to the duties required in connection with the direct control of communicable diseases, which branch of work will always be one of the primary functions of health boards, the modern health officer is required to supervise (1) the control of the city milk supply, with the large number of inspectors, veterinarians and analysts that that work requires, especially in the larger cities; (2) the inspection of factories, markets, stores, schools, theaters, tenement houses, lodging houses, bakeries, etc.; (3) the food and drug inspection service, with its inspectors and chemists; (4) the general sanitary inspection service of the city; (5) the protection of the public water supply, and prevent or remove sources of pollution; (6) the collection and disposal of garbage and other household wastes; (7) all other departments, including infant welfare and vital statistics; (8) the enforcement of the health ordinances of the city. A health officer is expected to be able to interpret the results obtained by the various chemists and analysts in his department, so as to advise his board as to the proper methods for it to follow. He will also be called upon to confer with the other city officials on matters that pertain to the general welfare of the community, in addition to the new questions that will continually come before him in his own department.

From this summary of some of the duties that belong to the administrative public health officer it should be apparent that a physician is no more fitted by his education for this position than the sanitary engineer. In the first place the position demands a man of executive ability. Without this qualification no one can make a success of the work, regardless of his general professional ability. Of two men who have equal executive ability the one should be chosen who is best fitted by his training to thoroughly understand how to deal with the greatest number of matters that will probably come before him for action during the discharge of his duties. An argument in behalf of a medical health officer is that he can seek the advice of expert sanitarians along the non-medical lines of his work whenever occasion arises. Is not the argument much stronger that a sanitary engineer, who by training is fitted for all but the medical lines of public health work, can seek the advice of medical men whenever occasion may arise, especially where, in the larger cities, medical men are in the employ of the health department, for it must be admitted that the purely medical side of administrative public health work is small in comparison with the total activities that should be undertaken by a health department.

The fact that doctors are trained from the standpoint of curing people of diseases rather than from the standpoint of preventing the transmission of diseases by general public health measures has already been recognized in New York State, where arrangements have been made by all of the medical schools to give a course in public health and sanitation. This will better prepare a physician for public health work than a course in the practice of medicine alone. The majority of physicians at the present time, however, have had no such training. The sanitary engineer, on the other hand, has received a liberal training by education and professional practice that will enable him to cope effectively with the majority of public health problems. He has had training (1) in all phases of public water supply problems, such as construction and operation of plants, analyses of the water, interpretation of results, special treatment of the water in case of emergencies, etc.; (2) in the design and construction of sewerage systems and proper methods of treatment of sewage in order to obtain the necessary degree of purification for the disposal scheme that must be adopted; (3) in the design and proper methods of operation of refuse disposal plants; (4) in chemistry and bacteriology, so that he is able to interpret the results of food, water and air analysis, or even to make the analyses himself; (5) in diagnostic bacteriology; (6) in a general way, in the entire branch of measures for the control of communicable diseases; and (7) in a general way, with the work of all of the departments of inspection that come under the control of a city health department.

If we consider the science of public health and sanitation as a composite science made up of the science of bacteriology, the science of sanitary engineering and the science of the practice of medicine, it is an undisputed fact that our executive health officials can not be chosen from the ranks of those who are experts in all three of these sciences. The attempt has been made to present the matter in such a way that it would be evident that the expert in the branch of public health known as the science of sanitary engineering is just as competent for a position as an executive health officer as the expert in the science of the practice of medicine. If this fact can be impressed upon the health boards throughout the country a more efficient health officer will probably be secured in many communities where the custom in the past has been to engage a physician, but where it is often impossible to secure a satisfactory man with the funds available, for the reason that a first-class physician can not afford to give his entire time to the work. Moreover, a practicing physician is often obliged for self-protection to be less vigorous in persecuting certain public health measures than a man who devotes his entire time to the work of the health department. If a sanitary engineer is placed in charge of the health department he has no outside work for which he has to sacrifice the efficiency of the department, but he is engaged in work that is exactly in line with his professional training.

In conclusion, it should be stated that many physicians have had the natural executive ability and the training so that they have made most excellent health officials. The object of this paper is not to decry the ability of the members of the medical profession for administrative public health work, but to show that the sanitary engineer should be recognized as standing on as high a plane as the physician, in so far as his ability for administrative public health work is concerned.

DISCUSSION OF THE PAPERS OF MESSRS. MORRIS KNOWLES AND C. H. WELLS.

Mr. H. P. Eddy: Mr. Knowles has very clearly set forth the conditions under which the various State Boards of Health are appointed, or elected, in the several states of this country, in the compilation of data in the appendix to his paper, and has described in a very interesting manner some of the features of the laws in the various states. It seems to me, however, that there is one point which is of vital importance, but which the author has not dealt with as fully as might be desired, and therefore I wish to call attention to the importance of selecting health officials, as well as many other city and state officials, with a view to their fitness for the position, rather than their political alliances. The unwritten law that appointees to local and State Boards of Health be appointed from within the community under consideration, is almost universal. It therefore frequently happens, and is not to be surprised at, that a municipality does not find residing within its borders, specialists educated and trained in this branch of public service. Under such conditions, it becomes a question as to whether the appointee shall be selected from a neighboring or distant community, and tendered the office, because of his professional fitness, or whether the so-called political "plum" shall be handed to a resident, and thereby furnish patronage to the administration.

When one compares conditions affecting the appointment of public officials abroad, as in Germany and England, and notes that very important officials, as mayors and engineers, are taken sometimes from a distant part of the country and given offices because of their natural ability, their technical training and their experience, it is easy to understand at least one important reason why municipal and state government in this country does not reach the high plane of efficiency obtained in some foreign countries.

Assured continuance in office is another important element in securing efficient administration of health boards. The writer has been personally acquainted with a health officer who, if his recollection is correct, was at one time a machinist, and yet because of long years of service in this department, he has become, and is now a most efficient official. While the municipality will undoubtedly be the gainer by appointing in the first instance, a man properly educated and trained by years of experience, yet lack of these qualities may in large measure be overcome by assuring continuance in office and freedom from political influence, so that effective service may be rendered.

It is certainly to be hoped that health boards will in the near future, be so organized as to attain more nearly to the ideals of efficiency mentioned and applied in the author's paper, and that officials acting under these boards will be appointed because of their education and practical training, and not merely because they happen to be local residents and voters.

Dr. W. S. Rankin: I regret that, on account of having a part on the program of another Section, I failed to hear Mr. Knowles' paper and most of its discussion; nevertheless, under the discussion I would like to say that, in my opinion, no profession has a monopoly on the production of health officers. I think if we shall accept as a definition of a health officer, qualifications of such an official based entirely upon an essential in his make up, we shall readily see that no profession—medical, engineering or even the laity can be barred in the selection of health officers. My definition of a health officer is, a man who reduces high death rates or maintains a low death rate.

It is all important that the general public grasp this idea so that when they entrust their health affairs to a real or supposed health officer, they may be able to retain the one or eliminate the other by noting his influence on their death rates after a reasonable length of time.

Col. W. F. Morse: The papers presented by Mr. C. H. Wells of Montclair and Mr. Morris Knowles of Pittsburgh indicate the rapid advance being made in public health administration work on the side of sanitary engineering, and afford a measure of the value of engineering services as compared with the medical service of the municipal health officers.

When three years ago at the meeting of this association in Richmond, the speaker brought forward a resolution for the organization of a sanitary engineering section, it was for the purpose of more accurately defining the status of many members of the American Public Health Association who were engineers and who were not then attached to any of the sections. It was felt that the engineering side of public health work demanded more recognition than had heretofore been given it, and if a section of engineering were added, many men whose work is intimately connected with public health affairs, would willingly add their names, and bring to the association the benefit of their knowledge and practical acquaintance with the many questions that arise in sanitary engineering.

These papers are indicative of the line of work to be carried on by engineers in connection with the medical profession, not as rivals or opponents, but acting entirely in coöperation with the medical health officers on lines of work in which skilled and expert engineering services are required, and which are not, as a rule, from the education or experience of medical officers, within their province of work.

These lines, including sewage disposal, water analysis and purification, refuse collection and disposal, and other allied branches, come properly under this division of sanitary engineering. For many years past, the speaker has been intimately connected with one branch of this service,—refuse collection and disposal, and has recognized the inability of municipalities to deal with this subject in many different phases except by employing the services of engineers. The collection of refuse and its disposal has been in the hands of medical officers for a long period of time, and owing to their limitations in experience, many mistakes have been made, and large sums of money expended uselessly. It is believed that the time has come when questions affecting the design, construction and operation, of plants for the sewage, water, and refuse of municipalities, should be placed under the charge of men trained in education and experience to more efficiently conduct and carry on these divisions of municipal work.

The subject is one which interests not only members of this association, but the large number of engineering classes in the several universities and colleges where the younger men are being trained in general engineering work. It has been the privilege of the speaker to present this question before the engineering classes of several universities,—Cornell, Columbia, Yale and others,—and there has always been found a very great interest and anxiety on the part of students to obtain a knowledge of fundamental principles underlying certain special classes of engineering, as for instance, refuse collection and disposal. It was pointed out that this is a coming question; that these men are the ones to whom the municipalities shall look in the future, and even a slight acquaintance with the principles of the subject in the beginning would afford them opportunities which might not otherwise arise.

We may contrast the somewhat inefficient method of training on this subject in America with the way in which the question is taken up in Great Britain. There, a class of men are trained in all questions of sanitary engineering affecting municipalities; pass through a series of competive examinations, and are appointed and retained in office as the authorities in charge of a class of municipal health work quite distinct from the medical officers. These men expect to make this their profession, are anxious to excel in all branches of their work, and form a strong and efficient corps of men at the service of the municipalities. Some such training as this, either by the aid of our universities and colleges, or through the officers of our State Health Boards, will be an invaluable asset in forwarding this work in the future.

The papers under discussion are of great value and assistance in pointing out lines of sanitary engineering upon which the future public health work will be carried on, and show that the sanitary engineers come to the aid and assistance of the medical officers, operating on distinct and well-defined lines without interference with medical questions, and afford the municipalities a much needed help in carrying out the sanitary reforms, and practical administration of purely business matters.

A medical officer who has been trained in sanitary engineering, and able to decide questions involving an expert knowledge of sewage water, refuse, gas and other municipal questions, is of a great deal more service as a health officer than as though he were limited solely to the administration of the purely medical side of health work in his locality. A sanitary engineer, who has also had the necessary training for the administration of purely routine medical work, possesses greater advantage over one who has not had this preparatory training, is far more competent to fill all the offices of a municipal health and sanitary officer than one who has not had these advantages, and is of consequent greater value to the municipality.

Mr. Paul Hansen: In the light of Mr. Knowles' very able presentation of the necessity of having in our public health service adequately trained experienced and paid men it would seem advisable that the American Public Health Association should lend its aid in some form toward the improvement in the personnel of boards of health and employees of these boards for it must be admitted that, after all, personnel lies at the very basis of any advance in public health and the science of sanitation.

Mr. Samuel A. Greeley: The papers presented by Mr. Wells and Mr. Knowles are very good. There is one point, brought out by the chairman, Mr. Hering, which is interesting in this connection; that is, the proper division of public health work. Mr. Hering emphasized the distinction between that phase of public health work which deals with the conditions and that phase which has to do with the construction of works to improve these conditions. This is important. Some work along this line was done in Milwaukee by the Bureau of Efficiency and Economy. This Bureau was established about three years ago to make a study of the operation of the various departments in the city hall. They first made a classification of the different operations carried on by these departments. They found, in particular, that the Health Department was doing some things that should properly have been done by the Department of Public Works. The scheme of reorganization, which they proposed, restricted the work of the Health Department to those lines of public health activities more closely associated with medical, educational and laboratory work. They proposed the appointment of a city sanitary engineer to carry out the work as recommended by the Health Department.

Prof. C.-E. A. Winslow: I am sorry that several of the medical health officers who were down on the program are not here for their contribution to the discussion would have been of special value.

It seems to me that the prime requisites for the health officer are that he should be an administrator and that he should be conversant with the fundamental principles of public health science. Public health is a very broad field and he cannot be a specialist in all its subdivisions. In any given case the best man may have begun as a chemist like Doctor Lederle of New York or as a physician like Doctor Young of Chicago or as an engineer like Mr. Vogelson of Philadelphia; or he may have been a bacteriologist to start with, or a statistician. In each case, however, the important thing is that he should have mastered the essentials of the whole problem and that he should have the ability to organize and inspire his whole corps of experts in their various lines.

I believe that in general the medical phases of public health work are likely to be more and more the dominant ones. Other things being equal, I should much prefer a man who was a medical man as well as a public health man, to one who had had either kind of training alone. On the other hand, I should much prefer a man who knew public health and not medicine to one who knew medicine but not public health; and this is the alternative with which one is frequently confronted. That is the reason why the New Jersey towns, Montclair and Orange and Elizabeth and Princeton and Plainfield, have placed young sanitary engineers in charge of their health departments. It was a practical condition which confronted them. They had local doctors but these doctors were not trained in sanitary science. So they turned to the Massachusetts Institute of Technology and got engineers who *had* been trained by Sedgwick, in sanitary science. And those young engineers have one and all made good. As a matter of fact there is a great dearth of men who are acquainted even with the broad principles of sanitary science and there is a still greater dearth of men who have this fundamental knowledge and are at the same time personally qualified for administrative public health positions. There are few offices which require a rarer combination of ability and courage and wisdom and tact, than that of health commissioner and in order to secure a man who measures in any way up to our ideal standard, I believe we should free ourselves as much as possible from professional or geographical limitations and should be free to pick the best available man for the place in whatever lines his education and experience may have lain.

Dr. W. H. Sanders of Alabama: Without undertaking to follow in detail the line of argument pursued by the Leader in support of his theme, the burden of his argument may be reduced to three propositions:

1. That medical men are maintaining a monopoly on public health service.
2. That provision should be made by law for rendering sanitary engineers eligible for membership on boards of health and for the position of health officer.
3. That in Alabama is to be found "the best example of the medical monopoly fallacy carried to its ultimate limit," quoting the words of the Leader.

In answer to the first proposition, which asserts that medical men hold a monopoly on public health service, some words of the *Leader* may be quoted with great force.

After emphasizing the fact that the "noble structure of modern sanitary science as it exists today," again quoting from the paper, has been built up by the medical profession, the Leader pays a high tribute to the profession for its work in this field, and denominates it a "superb example of altruism . . . public service . . . and scientific research." If the profession is entitled to this high compliment, why complain that it holds a monopoly? Instead of making such a charge would it not have been more in harmony with justice and good policy had the Leader entered a plea for giving the profession larger facilities and powers for still further building up what he calls "the noble structure of modern sanitary science?" If monopolies bear such fruit as the Leader freely concedes to the one he alleges the medical profession holds, would it not be wise policy to encourage, rather than to discourage, them?

The medical profession does not deny to any man, nor to any set of men, the right of promoting the public health in any way that is legitimate and legal, and no one more than medical men themselves welcomes the advances made in sanitary engineering, or is readier to profit by the expert knowledge of sanitary engineers.

How this expert help from sanitary engineers may be best secured brings us to the discussion of the second proposition, to wit, that provision should be made by law for placing sanitary engineers on boards of health and in the position of health officer.

The principle of division of labor underlies all social organism and all civil government. Applying this principle to the affairs of life, the medical profession believes that "public health service," to use the words of the Leader, lies more legitimately in its field of work than in that of any other class of citizens, or of any other profession. In the very nature of things this must be so, therefore, in undertaking to do work that rightfully belongs to it the medical profession does not concede that it is maintaining a monopoly. Just as well charge lawyers and preachers with maintaining monopolies because applicants for admission to the bar, or the pulpit, must qualify themselves in all departments of law, or of theology, not merely in one department.

Grant that sanitary engineers are qualified in one department of health administration to fill the positions claimed for them by the Leader, does that entitle them to fill all departments of public health administration? The expert help of sanitary engineers may be needed in almost any business or profession, and when needed is always sought for, but does that necessity create a right for these engineers to assume charge of such business or profession? The commander of an army, or of a navy, employs engineers, but does any "provision of law" exist for putting them in command of lines of battle on land or sea? A court may in adjudicating a case find it necessary to place engineers, sanitary or otherwise, on the witness stand, but should any "provision of law" exist for putting these engineers on the bench, or in the jury box? A farmer may employ an engineer to drain, or to irrigate, his land; would that create any right for such engineer to be placed in control of the farm, although greatly improved by his skill? The president and directors of a great corporation may employ engineers of various kinds, but should any "provision of law" exist for entitling such engineers to preside over the corporation, or to sit in its board of directors?

Is not the relation of sanitary engineers to "public health service" precisely parallel to the relations existing in the other services cited? If so, where is the reason or consistency in the Leader's demand for such legislation as would provide special privileges for sanitary engineers as respects their relation to "public health service"?

In Alabama we believe that boards of health should consist of physicians, and, as the Leader told you, we adhere practically to that belief, but we at the same time believe that such boards should avail themselves of the expert knowledge of sanitary engineers, of lawyers, chemists, or men of other callings, whenever such help is needed.

As the executive officer of the board of health of my state, I will say that for years I have desired to see a sanitary engineer attached to, but not a member of, the board, and as soon as a financial obstacle that has hitherto existed disappears I doubt not that this will be done.

In states in which mixed boards of health are the established policy no objection could be alleged against sanitary engineers serving on such boards; on the contrary, it is freely conceded that they would make more competent and more desirable members perhaps than any other non-medical men, but the principle of mixed boards is the one against which objection is made. Time does not permit of extended argument on the question of mixed boards, consequently, one reason only against such boards will be offered and that will be put largely in the shape of a mere affirmation. In constructing a public health system it is of the highest importance that the system be divorced from politics and commercial influence. This cannot be done if health officials be elected by popular vote, or by a legislature, or if they be appointed by the governor of a state. Turn the problem of the election, or appointment, of health officials over as you may, it will be seen that the only practical or possible way of absolving such elections, or appointments, from political or commercial domination is to concede to a thoroughly organized medical profession the right of electing these officials.

This plan posseses another great advantage, namely, it places the election of these officials in the hands of those most competent to judge of their fitness and efficiency. Were the lawyers of a state thoroughly and logically organized would they not make the best possible electors for naming the judges of the state, from the lowest to the highest? Does not the same principle apply to men of all businesses and professions?

The training of biologists, chemists, pharmacists and veterinarians is more or less closely related to that of physicians. Following out the reasoning of the Leader men belonging to all of these callings might demand such legislation as would entitle them to administer the public health affairs of a municipality, a county, a state, or of the nation.

Sanitary engineers have a field peculiarly their own, one that is rich in opportunities for usefulness. Their services in this field are sought after, and I may say are more liberally rewarded than are the services of medical health officials. It would seem therefore wisdom on their part to adhere to their own field and not attempt to occupy another field for which they are qualified in part only.

Let us analyze for a moment the qualifications of a sanitary engineer for the position of health officer.

A health officer should first be a physician, then, a sanitarian. It is far easier for a physician to acquire the practical sanitary knowledge necessary to equip him for the position of health officer than for a sanitary engineer to acquire the scientific medical knowledge necessary to equip him for the position of health officer. In fact, the former is comparatively easy, the latter, impossible.

To diagnose diseases and to differentiate between those that appear to closely resemble is one of the most important and essential functions of a health officer. Without this ability sanitary knowledge, however great, would be of no value whatever to a health officer; he would not know when, nor where, nor how to use it. He would be in the position of a man in charge of a mogul engine, or of an ocean steamer, who knows nothing of how to operate the former, or to navigate the latter.

Imagine the dilemma of a graduate of one of those "educational institutions" which the Leader says "are now training men especially for the new public health service" when confronted with a problem in diagnosis involving a differentiation between yellow fever and dengué or, between yellow fever and hemorrhagic malarial fever; or, between typhoid fever and incipient tuberculosis, or an estivo-autumnal type of malarial fever; or, between smallpox and a pustular syphilide?

For the reasons given, and others that might be given, the line should be very sharply drawn that would deny to sanitary engineers the right of occupying the postion of health officer.

It would be just as impossible for a sanitary engineer to do the work of a health officer as it would for a health officer to do the work of a sanitary engineer; each has his legitimate field and his limitations, which it would be wisdom on the part of both to respect. They should be coadjutors, not competitors, then, their coöperative work would immensely advance the sanitary interests of the people.

We have now arrived at the third and last proposition of the Leader, namely, that in Alabama is to be found "the best examply of the medical monopoly fallacy carried to its ultimate limit."

One who understands the philosophy and the logic of the public health system of Alabama finds it difficult to restrain a feeling of amusement at the recklessness of such an allegation. Charity comes to the rescue, however, and suggests that a man who mounts a hobby, as the Leader evidently has done, is utterly blind to every other virtue a public health system may possess save the one he has chosen for his steed. I am glad the Leader used such strong words, for he may have thereby captured your attention, and, if he did, I feel sure you will do me the courtesy to give me your close attention for a few minutes while I point out to you that the "fallacy" lies in the charge made and not in the system charged. If it turn out that the Leader has thrown a boomerang, he must be responsible for results.

As has already been intimated the public health system of Alabama rests upon a philosophic basis and is logically built up from foundation to dome. It did not grow up by chance, or by laying down arbitrary rules; neither has it been built up by experiment, that is, by trying one plan and finding it unsuccessful, abandoning that and trying another. On the contrary, the system was conceived by the greatest thinker on medical organization and public health systems that this country has ever produced—Jerome Cochran—and then the plans were formulated by that great thinker himself with the same care and accuracy that a master architect employs in drawing the plans for a great temple. This done, the system was submitted to the State Medical Association and was debated by that body at three of its successive annual meetings before it was adopted. After adoption by the organized profession of the state the public health features of the plan were submitted to the legislature and enacted by that body into law. All this occurred more than thirty years ago, since which time the system has been in operation. Investigation of results is courted, and had the Leader applied at the office of the State Board of Health for information as to what has been accomplised, and as to what is in process of accomplishment, it is morally certain that he would not have issued such a vulnerable attack on the system as he has done.

With the time at disposal it is utterly impossible to do more than to make a somewhat categorical statement of the chief virtues of the system, leaving to you "to read between the lines" and see how much in support of the system may be supplied by your own initiative.

1. The system corresponds in construction with that of our state governments; that is, it fully recognizes the principle of local self-government by conferring upon the organized medical profession of the counties the right of enforcing public health laws in their respective territories, reserving to the state, however, the right of supervision, and in the last analysis of absolute control.

2. The system was predicated upon the idea and the expectation of bringing about the thorough and uniform organization of the profession in every county of the state, and, then, the coördination of these county organizations into one coherent and homogeneous state organization, all of which was accomplished a quarter of a century or more ago.

3. The objects of organization, as set forth in the constitutions of every one of the county societies and in the constitution of the state association, are:

(a) To cultivate the science and the art of medicine and to widely distribute the knowledge thus acquired among the members of the profession of the state.

(b) To uphold the ethics of the profession.

(c) To obtain and enforce a law regulating the practice of medicine.

(d) To perfect and administer a public health system that covers the entire state, and can be promptly and accurately put into operation whenever and wherever needed.

It may be safely affirmed that all of these objects are being achieved, the state having, as said, put upon them the seal of law.

4. County medical societies, to membership in which all reputable physicians in the county are eligible, are made by law boards of health for their respective counties, thus establishing *deliberative* health bodies, composed of men who are daily going in and out of the homes of the sick, therefore in close touch with the health conditions prevailing in their several territories and fully cognizant of the sanitary needs of the people.

These deliberative boards are supplied with executive officials from their own ranks and of their own choosing, which officials they may at any time remove for cause.

This arrangement gives every reputable physician who chooses to become a member of his county board of health a voice in shaping the public health policy of the county, and the right of seeing that public health work is efficiently done.

5. The State Medical Association, made by law the State Board of Health, consists of permanent members and of delegates from county medical societies, and is authorized, through its executive officials, whom it elects and can remove at pleasure, to supervise the enforcement of the health laws of the state by the county boards of health.

The State Board, like the county boards, is a *deliberative* body, with a state health officer, surrounded by an advisory committee of ten members of the State Board, actively engaged all the while in public health administration.

6. The system has resulted in the establishment of *one board of medical examiners only,* the members of which are elected by the State Medical Association, and before which board all applicants for a certificate of qualification to practice medicine, regardless of the school or sect of medicine to which they may belong, must appear, thus guaranteeing a uniform standard of qualification.

7. The system is absolutely divorced from politics and is independent of commercial influence, rendered so by the fact, already pointed out, that all executive health officials are elected by the organized medical profession.

After this presentation of the main features of the system will any one agree that the Leader's strictures are just, simply because, forsooth, provision has not been made for placing sanitary engineers on the boards of health of the state and in the position of health officers of counties, towns, and of the state? It has already been announced that the boards of health and health officers stand ready to call upon sanitary engineers for help whenever their services are needed, and whenever the people provide the means with which to remunerate them.

The Leader closes his paper with the following severe indictment:

"Narrowness of scope; incompleteness of work from the broader sanitary point of view; emphasis on *cure* rather than on *prevention;* and insufficient realization of the importance of reliable statistics may well result from so remarkable and oligarchical plan of organization." Did a volunteer authority on public health systems, one who possibly never participated in the practical administration of a public health system, ever reach quite such a pitch of captious and groundless criticism? Five assertions made in quick succession and not a word of proof offered for either one of them!

"Narrowness of scope," he says. It has already been pointed out that the one homogeneous and coherent system of organization in Alabama covers the following fields: The cultivation of the science of medicine and the distribution of the medical knowledge thus acquired; upholding the ethics of the profession; enforcement of the law regulating the practice of medicine; the practical administration of the public health system of the state. If this is "narrowness of scope" will the Leader be good enough to suggest in what directions the system may be broadened, and will he be accommodating enough to point out another state in the Union in which one and the same system of organization of the medical profession is endowed by law with corresponding amplitude of powers?

He next says, "incompleteness of work from the broader sanitary point of view."

Two things are indispensable in order to make sanitary work as complete and as broad as it might otherwise be. These things are money and sanitary knowledge. While it is humiliating to be compelled to admit that since a momentous event transpired under an apple tree, near Appomattox, Va., 47 years ago, the treasury of the State of Alabama, like that of many other Southern States, has been by no means overreplete, nevertheless, the admission is true. When, however, the explanation is made that this depletion has been largely due to the financial operations of a set of men who inundated the South, soon after the apple-tree episode, and seeing their opportunities of getting possession, through the negro vote, of state and municipal exchequers, they warmly embraced the opportunities and not only converted said exchequers into enormous vacuums, but piled up in place thereof colossal bonded debts that were highly creditable to their financial enterprise, it would seem that Alabama should not be so severely condemned by the Leader for not having conducted her sanitary operations on quite as broad a scale as states have been able to do that did not suffer similar invasions. No reflection whatever is intended for that other class of men who came into the South, bringing with them money, brains and strong hearts, and, identifying themselves with our people, helped, and helped heroically, to rehabilitate the wrecked South.

Further, the population of Alabama is largely a rural one, hence the same imperative necessity for conducting sanitary operations on a scale as broad as has been demanded in states where large aggregations of population are found does not exist. If the Leader will but exercise a little patience Alabama may after a while approximate his standard of broadness of sanitary operations.

The next count in the indictment is:

"Emphasis on *cure* rather than on *prevention.*"

While we do plead guilty in Alabama of putting considerable emphasis on cure, and I dare say were the Leader critically ill in Alabama he would not object to such emphasis, yet perhaps he does not know that beginning with 1897, for four years out of five, when other Gulf States were extensively ravaged by yellow fever, their people smitten and dying, or flying; their commerce paralyzed; the wheels of their trade and traffic silent in many places; confusion and terror prevailing everywhere, Alabama was through the prompt enforcement of her splendid quarantine system completely protected from the scourge, her people serenely pursuing their occupations, her merchants reaping larger trades than usual, owing to the utter demoralization of trade in many of the marts of her neighboring states!

Was this no emphasis on prevention?

Compare the records of Alabama and other Gulf States as to the prevalence of yellow fever for those eventful five years and see whether Alabama was wholly oblivious to prevention?

Does the Leader know that a vigorous campaign against hookworm disease was put into operation in Alabama nearly three years ago; that the campaign has been carried very exhaustively through twenty-six counties and will be pushed into all of the other counties; that in round numbers 25,000 victims have been rescued from the disease, and that along with these *cures* efforts are being made to eradicate the infection by bringing about improvements in the sanitary conditions of not only the cities and towns but of every farmhouse in the state?

Is that putting all "emphasis on *cure* and none on *prevention*"?

In addition to this, the Leader is hereby notified that a campaign against tuberculosis, typhoid fever, pellagra and malarial fever will soon be put into operation in Alabama and carried, not only into every county, but into every neighborhood of the state for the purpose of educating the people as to the *prevention* of these diseases.

If nothing hitherto done is entitled to commendation by the Leader will not the completion of the campaign just mentioned mollify somewhat the severity of his arraignment of Alabama?

The fourth count in the indictment is: ". . . insufficient realization of the importance of reliable statistics." Could the Leader step into our department of Vital and Mortuary Statistics any day and see what is going on there; see how Alabama is climbing the hill of success in the collection of vital and mortuary statistics, with every prospect of soon reaching the summit and claiming her right to recognition as a registration state; could he see with what care and system the statistics gathered are being filed, so as to make them easy of access for all time to come; and could he know that the birth and death certificates obtained have been made by law *prima facie* evidence in any court of the state of the fact of such births and deaths; could he see reports of any one of the fifteen diseases made reportable by law coming in whenever present in any part of the state, I am sure he would quickly and cheerfully withdraw the allegation of "insufficient realization of the importance of reliable statistics."

We now come to the last count in the indictment, which, if possible, involves the Leader in greater disaster than any preceding one. The count is in these words:

". . . so remarkable and oligarchical plan of organization."

"Oligarchical!" How unfortunate the word; what a misfit when brought face to face with the facts!

Is there a place in the world outside of Alabama, where from fifteen physicians in the most rural county of the state to three hundred in the most populous, are authorized to meet as boards of health and deliberate on what may be done to improve sanitary conditions, and not only to deliberate, but to direct the work of their executive officials?

Is there a state in the United States, outside of Alabama, in which 234 voting members of the state Board of Health are authorized to meet annually, and oftener if emergencies so demand, to deliberate upon the general health conditions prevailing in the state and to exercise supervision over the execution of health laws by county and municipal authorities, with a state executive officer on duty every day in the year?

If boards of health composed of such numbers as those given constitute an "oligarchy" the query is what is a democracy? Did not the Leader reckon without his host when he applied the epithet "oligarchical" to the "public health system of Alabama?"

Evidently the Leader vainly imagined that he understood the public health system of Alabama and acting under that delusion he ventured to assail it in ugly fashion, the main motive of his assault appearing to be that provision is not made for placing sanitary engineers on the boards of health of the state, when, as has been more than once said, there is no desire or intention on the part of those boards to deprive the people of Alabama of the valuable services of sanitary engineers.

Not satisfied with simply suggesting the addition of sanitary engineers to boards of health in Alabama, the Leader assumes to pronounce wholesale condemnation of the system and warns other states to avoid it as they would infection.

Perhaps the system will crumble and fall under the attack of the Leader, or, perhaps the damage done will be accurately represented by that which would result from firing a pop-gun at Gibraltar. Time will no doubt arbitrate between these two alternatives.

In taking leave of the Leader's paper I do so with the utmost kindness and charity, feeling persuaded that had he understood the public health system of Alabama, instead of making it the object of a special and bitter attack, he would have given it his warm endorsement.

Closure by Mr. Morris Knowles:—

The author's hopes have been more than realized by the diverse and able discussions that have been presented. His belief is justified that the subject is one of general interest, and one needing consideration and clarification.

He will not attempt to contribute anything further but there is one misapprehension that ought to be corrected. One of the three propositions to which Dr. Sanders reduces the argument is "That provision should be made by law for rendering sanitary engineers eligible for membership on boards of health and for the position of health officers." This is, of course, a misstatement of the author's position, and the discussion thereon is to that extent in error. Such a provision would merely result in the substitution of one monopoly for another, and the author would combat as vigorously the proposal to legally limit public health service to sanitary engineers, or to doctors and sanitary engineers, as he does the present situation. A more correct statement of Dr. Sander's second proposition, and of the author's thesis would be "That provision should *not be made* by law for rendering *medical men alone* eligible for membership on boards of health and for the position of health officer."

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THE COLORADO SPRINGS MEETING.

The 1913 meetings of the American Public Health Association are to be held in Colorado Springs, September 9th to 13th inclusive. This will be the first time that the Association has assembled in this beautiful city and it behooves members to make their plans well ahead so that they may be able to be in attendance. There is no finer place than Colorado Springs and vicinity in which to spend one's vacation, and it is sincerely hoped that the splendid showing of the Association at the September 1912 meetings in Washington, will be equalled.

The Program Committees have already started on the preparation of strong and attractive programs for the General Sessions and the Section Meetings.

Past experience has demonstrated the value of well thought out and executed Symposia on topics of immediate importance, and the Secretary of the Association will appreciate suggestions from members as to subjects which are adapted to such discussion at the meetings.

The following gentlemen act as chairmen of the program committees and would be glad to receive suggestions at an early date concerning subjects for consideration:—General Sessions, Professor S. M. Gunn, 755 Boylston Street, Boston, Mass.; Laboratory Section, Professor Edward Bartow, University of Illinois, Urbana, Illinois; Section on Vital Statistics, Doctor J. E. Monjaras, Mexico, D. F., Mexico; Municipal Health Officers' Section, Doctor John H. Landis, Health Officer, Cincinnati, Ohio; Sanitary Engineering Section, Mr. R. S. Weston; 14 Beacon Street, Boston Mass.; Sociological Section, Doctor H. E. Dearholt, Goldsmith Building, Milwaukee, Wis.

Special attention of the members of the Association is drawn to the fact that it is no longer necessary for a person desiring to join the Association to have been employed for three years in the technical branches of public health work. Anyone interested in the objects of the Association who is properly endorsed by two members is eligible for membership. The Secretary will be glad to furnish application blanks and urges the co-operation of all in securing new members. Not only is this of supreme necessity on account of the financial aspects, but if the Association is to perform its true functions it must have the active participation of all whose aspirations and ideals are those of the Association.

USE AND ABUSE OF PUBLICITY.

The American Journal of Public Health has frequently urged the need of sane publicity in matters of hygiene and preventive medicine. The old order of mystery has passed and the more or less intelligent participation of the layman in the procurement of his own physical welfare is a fact. To make this participation as effective as possible is the object of the present public health movement and the responsibility therefor rests squarely upon the shoulders of the physician, the hygienist and the available agents of publicity of which the newspaper and magazine press of the country are by far the most important.

The dangers of the new dispensation have just been given a discouraging expression in the country-wide exploitation of the announcement of a new specific treatment for tuberculosis by Dr. F. F. Friedmann of Berlin. It is too soon at this writing to make any positive statement as to the value, or lack of it, of the reported "discovery." It is not too soon to denounce in unmeasured terms the irresponsibility of the news syndicate which has flooded the country, and particularly the West, with extravagant accounts of the "cures" accomplished in Berlin and which the most casual investigation shows to be still open to question and in the early stages of observation.

While the circumstances attending the announcement, and particularly the subsequent developments, make an unpleasant impression and are daily acquiring an increasingly commercial tinge, it is quite possible that Dr. Friedmann's work may contain a contribution of value and mark an advance in phthisiotherapy. From the meagre reports now available it would appear at least to fall within the field where we are justified in expecting progress. That it contains a discovery of a revolutionary kind there is no indication. However this may be, there is no worse cruelty than to rouse false hopes in the army of struggling consumptives and that bitter disappointment awaits thousands of eager sufferers is the strong probability in the present instance.

REVITALIZING DEVITALIZED CHILDREN.

AN OPEN WINDOW EXPERIMENT.

A COMPARISON BETWEEN THE PROGRESS OF PUPILS TAUGHT IN AN OPEN WINDOW CLASS-ROOM AND THAT OF THE PUPILS OF A PARALLEL GRADE TAUGHT IN AN ORDINARILY VENTILATED AND HEATED CLASS-ROOM IN THE SAME SCHOOL BUILDING.

Walter W. Roach, A.M., M.D.,
Supervising Medical Inspector, 4th & 5th Districts, Philadelphia.

The test was made at the Alexander Dallas Bache School, 22d and Brown Streets, Philadelphia, during the winter session of 1912.

After consultation with Mr. Walter C. Bishop, supervising principal of the above school and Mr. Albert H. Raub, district superintendent, it was decided to devote one class-room, with the heat cut off and the windows wide open, to teaching in nature's air with a minimum of artificial tempering, a normal third grade class the regular third grade work.

It happened that in this same school there was another class of equal number of pupils, of the same grade, occupying a room heated and ventilated in the ordinary way, so that we were able to keep accurate records and make a fair comparison.

In order that there should be no appearance of compulsion in the matter of attendance, the medical supervisor of the district first addressed a letter to the principal expressing the opinion that the stimulating effect of cool fresh air would benefit both pupils and teachers mentally and physically, and asked that some teacher in the school volunteer to teach the children through the winter with the class-room windows wide open. Happily there was no lack of volunteers and the problem of securing a willing teacher was solved.

The following circular was then addressed to the parents of about sixty of the third grade pupils, explaining the purpose of the movement and enclosing a blank application form to be filled out and signed by those who desired that their children be taught in this open window room.

Bache School, Philadelphia, September 20, 1912.

To the Parents:—

Your attention is called to an open window class-room at the Bache School. Its purpose is to give Nature a greater opportunity to help our children to learn rapidly and to grow strong. The cold, fresh air of our new class-room will be soothing to the nerves and stimulating to mind and body.

The occupants of this room will be protected in extremely cold weather with extra wraps and sufficient heat. They will not be subjected to draughts. They will be given exercise and freedom that is not possible in the ordinary class-room. Their physical welfare will be looked after constantly and noted regularly by the Medical Inspector. If you desire your child to be considered with others, as an applicant, please fill out and return enclosed blank.

Yours very truly,
WALTER C. BISHOP,
Principal.

Appended to the circular was the following quotation from a report on open air work.

"Fresh air increases the vitality of pupils and teachers, and makes them more alert mentally. Children taught in fresh air learn with avidity. They do not require perpetual reviews so common in hot air rooms. They are happier and grow more rapidly in cold air. The discipline of a class is reduced to its simplest problem. A cool humid air is soothing to the nervous system and removes the sources of ordinary friction among pupils, and between them and their teachers."

Upwards of fifty applications were received from parents, signifying their willingness to have their children enter the class and to have them weighed, measured and examined periodically, according to the following form:

APPLICATION

is hereby made to the Principal of the Bache School, 22d and Brown Streets for admission to an Open Window Class-room of

Name of pupil...
Age....Grade.......Address..................................
Date...........................Signed...........................
Parent or Guardian.

PHYSICAL EXAMINATION

General Appearance..
Height......inches. Weight......lbs. Chest......inches.
Nose and throat..
Lungs...
Heart..
Miscellaneous findings..

NOTE.—A weekly health record, including weight and measurements, to be kept during the term.

Signed ...., School Inspector.
Endorsed ...., Medical Supervisor.
Approved for Admission ...., District Supt.

These children were then carefully examined by the school inspector; his findings reviewed and verified by the medical supervisor, and the recommendation for the admission of each child to the open window class-room was approved by the district superintendent.

EQUIPMENT.

Desk chairs were provided for routine class work in order that they be readily moved aside by the pupils to clear the floor space for physical exercise.

This freedom of desk movement also enables all children to be so seated that their eyes are properly protected from the unobstructed and unfiltered light.

Standard platform scales with measuring attachment for quickly and accurately determining height and weight were installed. Woolen blankets, sweaters, woolen caps and hoods, and knitted woolen gloves were also provided for use in exceptionally cold weather, to guard against disturbing the equilibrium of the circulation which might follow from the children sitting with their upper extremities in a stratum of air warmer than that to which their lower extremities were exposed.

The pupils were not fed at the school. None of them were tubercular children and we were not conducting an open air sanatorium for sick children. In all respects the room was equipped as the ordinary school-room except that it was shut off from the regular heating plant of the building, save on those rare occasions when it was found necessary to bring the temperature up to 50 degrees Fahr. The regular school program was followed during the term, with some modified physical exercise. We were using that which Nature furnished from day to day in the matter of fresh air and humidity, and setting an example to the children in ventilation which they carried to their parents at home. At the same time we were driving home the idea that this group of normal and sub-normal children could be taught better in fresh cool air than in warm vitiated air and that by simply throwing open the school-room windows we could secure ideal conditions.

The purpose of this article being to illustrate a comparison between open window school-room work and similar work performed in warm air school-rooms the information regarding the personnel of the parallel grades is set forth in the same detail, there being no selection of pupils except that those in the open window room were placed there at the request of their parents.

OPEN WINDOW CLASS.						WARM ROOM CLASS.					
	Age.		Wt.	High.	Chest.		Age.		Wt.	High.	Chest.
1 Charles A. . .	13 yrs.	1 mo.	82 lbs.	57 in.	27 in.	1 George B. . .	12 yrs.	0 mo.	88½ lbs.	61 in.	26 in.
2 Edwin B. . . .	13	2	73	58	24½	2 Bernard H. . .	12	0	88¼	60	26¾
3 James G.	9	9	71½	54¾	24¾	3 Joseph A. . . .	12	8	80½	56½	25½
4 John K.	12	0	71½	56	25½	4 Joseph O. . . .	12	1	79½	55	26⅛
5 Howard A. . . .	10	6	65¼	53⅝	27	5 Edward J. . .	12	1	70½	55	24½
6 Milford B. . . .	9	10	67¼	54	24⅝	6 George A. . .	9	8	69¼	53¼	24⅛
7 Otto C.	9	11	68¼	54½	24⅜	7 Harry W. . . .	10	0	69	52½	25¼
8 Maurice C. . .	9	3	69	55½	24⅛	8 William G. . .	9	0	68¾	53½	24⅛
9 Raymond C. .	9	9	62	49¼	25¼	9 James F.	10	0	68	53	24¼
10 Earl S.	9	6	59	51¾	23¼	10 Thomas B. . .	11	6	67¼	55	27½
11 Raymond H.	9	8	59	51¾	$23\frac{3}{16}$	11 Edward A. . .	10	1	67¼	52½	24¼
12 George G. . . .	8	8	58	52	23⅛	12 Joseph McF.	12	9	67¼	53½	24½
13 John Z.	9	8	57¾	49½	26½	13 Frances E. . .	10	2	66½	54	27
14 William D. . . .	9	7	57¼	51	$24\frac{3}{16}$	14 William O. . .	10	4	64½	51¼	23¼
15 Thomas O'D.	9	2	57¾	51¼	24⅞	15 Alex B.	8	11	62¼	53	24½
16 David A.	10	2	56½	52	23⅝	16 Amerego S. . .	10	5	61¾	50½	23¼
17 Bruce McF. . .	8	2	55¼	51¼	22⅞	17 Lewis R.	9	10	61½	50½	24¼
18 John B.	8	4	58½	50½	23¾	18 Warren McC.	10	8	61½	53	24⅛
19 William S. . . .	8	4	56½	56	$23\frac{9}{16}$	19 Gilbert M. . .	8	8	61	52¼	23¼
20 Charles V. . .	10	0	60	50½	24⅛	20 Edward N. .	11	3	60¾	52	23½
21 John Bd.	8	11	54	48	23⅝	21 William R. . .	8	2	60½	51½	23¼
22 Frank B.	8	4	54¼	49	22⅝	22 George D. . . .	10	0	60	51	22½
23 Herbert R. . . .	9	10	55	53¼	25½	23 Lewis D.	9	0	59	50	23½
24 James L.	8	8	49	48¾	$21\frac{15}{16}$	24 Thomas M. .	9	0	59	53	25⅛
25 William M. . .	8	8	48½	51	23⅛	25 Raymond B. .	9	3	56½	49½	23¼
26 May L.	11	0	75	60	21½	26 Hy. T.	10	8	56¼	50	24¼
27 Ray W.	12	0	68¼	58	24⅝	27 William A. . .	9	11	55¼	50¾	22½
28 Mary K.	10	8	67¼	54½	27⅛	28 Joseph G. . . .	9	1	52½	50	25½
29 Agnes S.	9	8	65½	54	23¾	29 Emil A.	8	5	53	48½	23⅛
30 Cath. McC. . .	11	0	63¼	55½	23⅛	30 William G. . .	9	6	47	48	21¼
31 Rebecca B. . .	8	2	62½	52	25⅛	31 Harry F. . . .	12	2	61¼	52¼	23¾
32 Evelyn S.	11	0	62½	51	25⅛	32 Ruth R.	13	1	105½	54	32
33 Ada M.	11	0	61¼	53	25¼	33 Olga U.	12	0	99½	60½	28¾
34 Mary A.	9	10	60¾	49½	23⅝	34 Ruth K.	11	9	75½	56	25¾
35 Florence E. . .	10	0	63½	54	27½	35 Mildred D. . .	8	10	69¾	55	23⅛
36 Eva G.	9	0	56¼	50½	23½	36 Marian A. . .	12	5	69	55½	26
37 Alberta H. . . .	9	3	58¼	50¾	23¾	37 Jennie U. . . .	10	10	67	53	26
38 Agnes M. . . .	10	4	58¼	51½	24⅜	38 Mildred M. .	8	8	61	51¼	23½
39 Bessie N.	9	3	52½	52½	24½	39 Carrie C. . . .	8	10	59	51	23¼
40 Marie M. L. .	10	5	41½	45	21⅞	40 Lillian P. . . .	9	1	58½	49	22½
41 Dorothy M. . .	9	3	46½	49½	$22\frac{3}{16}$	41 Katie T.	9	9	57½	51	23⅛
42 Rachael G. . .	10	6	59¼	54½	24¼	42 Marg. McC. .	10	9	49¾	48¼	22¾
43 Gladys A. . . .	8	8	49¼	47½	21⅞	43 Ethel K. . . .	9	0	49¾	48½	23¼
44 Sadie T.	11	10	69	54	27	44 May N.	10	7	67	53½	23½

Total 2669
Avg. wt. $60\frac{29}{44}$
25 Boys 1526 = Avg. $61\frac{1}{25}$ lbs.
19 Girls 1143 = Avg. $60\frac{3}{19}$ lbs.

Total 2893 lbs.
Avg. wt. $65\frac{23}{44}$
31 Boys 2004 lbs. = Avg. $64\frac{20}{31}$ lbs.
13 Girls 889 lbs. = Avg. $68\frac{5}{13}$ lbs.

In order to more plainly illustrate the physical condition of the two classes of children the following charts are submitted. The vertical lines represent the years of age, the horizontal lines pounds of weight and the curved lines the normal average weights of children for different ages.

The physically sub-normal or under-weight-for-age of each class are shown by the irregular lines joining the numbered black dots below the curves in each chart. The numbers alongside the dots correspond to the number opposite the children's names in each class list of pupils.

It will be noted (chart A) that there were eighteen markedly underweight children in the open air class, three of them between eight and nine years, the normal age for this grade, three between nine and ten years (one year retarded), five between ten and eleven (two years retarded), three between eleven and twelve years (three years retarded) and four from twelve to thirteen years, four years retarded.

In the other class (warm room) (chart B) there are nineteen physically sub-normal pupils, six between nine and ten years of age (one year retarded), seven between ten and eleven years of age (two years retarded), two between eleven and twelve years of age (three years retarded) and four between twelve and thirteen years of age (five years retarded). These retarded children, waterlogged at third grade when they should have reached the sixth or seventh, had already lost many years of opportunity, and the cost to the board of education was many, many dollars more than necessary.

CHART A.

Open Window Class

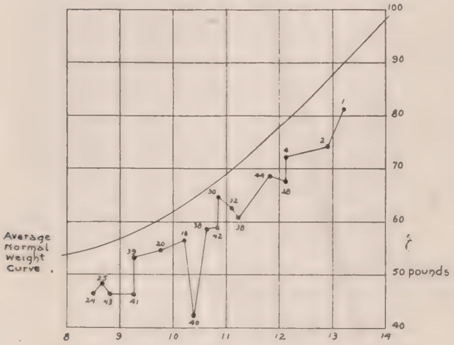
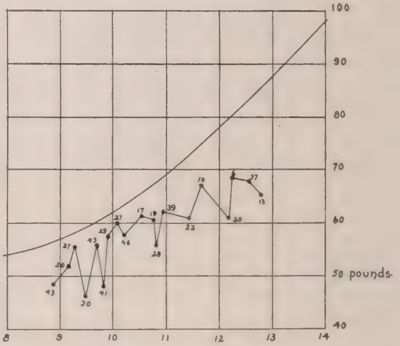


CHART B.

Warm Air Room



Conclusions.

The beneficial effect of the open windows, on the health and scholastic progress of the children can be attributed to the following:

Volumes of pure, fresh, cool air roll into the room with none of the vital qualities impaired by artificial handling; Nature's proper proportion of moisture is mixed with this atmosphere, varying from hour to hour and day to day. The bracing effect of cold is stimulating to health and renders the children more resistant to infecting bacteria and disease. It prompts frequent class drills and exercises, which prevent air stagnation in the room and enables every pupil to change his breathing zone. The lungs are thoroughly ventilated as well as the room. Expired air at body temperature and exhaled gases at over 90° Fahr, set free in the cold air room, rise rapidly to the ceiling and pass out the upper window openings, being replaced by the pure air coming in the lower window openings. The physical exercises are designed to maintain chest elasticity, affording opportunity for normal lung expansion and thus the children acquire proper breathing habit. This means better aëration of the blood with resulting mental stimulation. Certain it is that these fresh air pupils are live wires.

The class seated. These photographs are intended primarily to show the open windows and are purposely taken against the natural light, without flash powder.

Almost anyone on reflection will be impressed with the futility of expecting a maximum progression physical and mental, when children are housed in overheated rooms, with little or no moisture, compelled to sit in uncomfortable positions and perform tasks prodigious and complicated to feeble and inactive minds resulting from undernourished and devitalized bodies. Such children, passing on dismissal into the cool moist atmosphere outside the building have the respiratory mucous membrane suddenly chilled and "catch cold." Not so with our pupils of the open windows, breathing a mixture of air and moisture at a temperature more nearly that of the outside atmosphere. They do not encounter such a sudden change at recess or on the homeward journey and do not "catch cold." They keep well and are regular in attendance. It can safely be said that the chief cause of "colds" in school children is not exposure to cold as such, but exposure to the overheated and confined air of school-rooms and living rooms. It can also be safely assumed that the best available air for school-room purposes is the cool outside air with its proper mixture of moisture, which Mother Nature so bountifully provides for all willing to receive.

Pupils moving their desks to side walls of room to clear floor space for physical exercises. Time necessary, one minute. After exercise it takes one minute to replace them and resume class work.

AS TO THE WEIGHTS.

The total weight of the 44 pupils in the open window room September 30, 1912, was 2,669 pounds—an average of $60\frac{29}{44}$. The 25 boys weighed 1,526 pounds—an average of $61\frac{1}{25}$; the 19 girls weighed 1,143 pounds—an average of $60\frac{3}{19}$ pounds.

TWELVE WEEKS' GAIN.

On the last school day in December (at the end of 12 weeks) the average weight of the boys was $63\frac{5}{24}$—an average gain of two pounds; the average weight of the girls was $62\frac{7}{13}$ pounds—an average gain of two pounds.

The Physically Sub-normal Ones.

The *under weight* of the 18 physically sub-normal pupils in this class, calculated on the average normal weight for their respective height and ages, was $146\frac{1}{2}$ pounds or an average of $8\frac{1}{2}$ pounds. Seven of these were boys, total weight September 30, 435 pounds—average $62\frac{1}{7}$ pounds; December 20 their total weight was 449 pounds—average $64\frac{1}{7}$ pounds—gain two pounds average. Two of the girls at the end of ten weeks, one after gaining two pounds and the other three pounds, were transferred to other schools; at the end of twelve weeks (December 20) the actual gain of the nine sub-normal girls remaining in the class was $24\frac{3}{4}$ pounds—an average gain of $2\frac{2}{3}$ pounds. And so the gain has been uniform, boys and girls alike; normal and sub-normal alike, and a fraction over two pounds average, each.

Class at Exercise—Chest lift. Arms up and back to Y stretch position.

In the Warm Air Room.

The example set by the open windows, and the benefits observed by other teachers in this building led most of them to keep an eye on their classroom thermometers with the result that windows were freely and frequently thrown open in many rooms several times a day, and more often than heretofore. Particularly was this true in the room of the parallel grade with

School Nurse Weighing and Measuring Pupils.

which a comparison of results was intended to be made. This teacher was naturally anxious that her pupils should compare favorably in every way with those taught in the open window room, and the medical supervisor could not consistently ask her to keep her windows closed and deny to her pupils the fresh air to which he knew they were entitled. So in the early fall they also gained in weight and it was not until cold weather set in late in November that they were in very warm air. Their weight averaged $65\frac{30}{44}$ September 30 and $66\frac{23}{44}$ December 20—just about one pound average gain as compared to the two pounds average gain in the open window room children.

The class work of the fresh air children has shown improvement in the same marked degree. They enjoy study in the cool air and learn rapidly. Results show it.

APPENDIX.

ALEXANDER DALLAS BACHE SCHOOL,
PHILADELPHIA, January 23, 1913.

Dr. Walter W. Roach,
District Medical Supervisor.

DEAR SIR:—You ask my opinion as to what effect the open windows had upon the mental activity of these children. Three months ago when we began our experiment it was with the assumption that, as the speed and joy of a walk increase as the temperature falls from 70 degrees to 50, an analogous change would take place in the mental activity of pupils as we lower the temperature of school-rooms by letting in the pure, cold, outside air. While the time has been short and the weather unfavorable for exhaustive study, I am of the opinion that, as the temperature falls to 50 degrees, day-dreaming on the part of particular pupils decreases and the alertness of the whole class increases. This means better attention and more effective work.

To prove that these conclusions are founded upon fact is a difficult task. Every schoolman knows how hard it is to measure the progress of a class of children without involving the question of the merit of teaching. As far as possible I have tried to do this by three simple exercises given to an open window class and a closed window class of the same grade. These exercises consisted of committing to memory and writing four lines of poetry, of solving four problems in the primary operations of arithmetic and of studying and writing fifteen difficult words. The teachers took as little part as possible in this work. The exercises were given on different days with the following results:

Closed Window Room	Open Window Room	
		Poem:
39	32	No. of pupils in class.
33	33	No. of words and punctuation marks and capitals in selection.
1287	1056	Total number of words and marks for all pupils.
1108	967	No. of words and punctuation marks correct for all pupils.
86	91.5	Percentage correct.
70	46	Temperature of rooms.
		Arithmetic:
38	32	No. of pupils in class.
4	4	No. of problems.
152	128	Total number of problems for all pupils.
92	93	No. of problems correct for all pupils.

60.5	72.7	Percentage correct.
64	48	Temperature of rooms.
		Spelling:
39	29	No. of pupils in class.
15	15	No. of words.
585	435	Total number of words for class.
342	251	Total number of words correct.
58.4	57.7	Percentage correct.
70	48	Temperature of rooms.

Fifteen minutes were allowed for arithmetic and twelve minutes for each of the other exercises. While the results can hardly be called a proof of our claims, we believe with our other observations that they are straws that show the direction in which the wind is blowing and so shall continue our study of the subject.

Yours very truly,

Walter C. Bishop,
Principal.

EFFICIENCY

M. T. Stevens.

Chief Sanitary Engineer, Department of Health and Sanitation, Seattle, Wash.

In every business the keynote of success is efficiency in every branch or department, whether the business be large or small, a notion store or a ship building plant; and especially should efficiency be demanded in connection with municipal government in all its branches.

How many times have citizens, and others, been heard to remark that a government or municipal job is considered a snap. But why is it so? Is it because the general public, upon going into a public office, notices a number of employes moving about with all the appearance of lack of work, or lack of interest in their work, or is it because the public does not understand the amount of work connected with any public office? There is certainly some reason for this adverse attitude on the part of the public.

Let us review the case of the municipal department which seems to be the center of attraction all over the civilized world today, and that is the Health Department. There is not a department in which it is more difficult to show a return for money expended than the Health Department. It shows no financial income, or any other return for the money expended, which can be counted as a gain in wealth, unless one will take the time to peruse a lot of dry statistics and comparisons, and then it is a question whether the dear taxpayer is entirely satisfied with the results the figures show him.

It is a difficult thing to convince the people that a low death rate is brought about by the activity of the Health Department. It is also very difficult to make people realize that in saving and protecting human life many dollars are saved to the country or to the State. When we request people to do things that we think will protect the health of our citizens they say, "Those conditions have existed for the past fifty years and I am as healthy as any one." I know of a case where a certain well had been used for drinking water for a great many years and the people who used it were apparently, always strong and healthy, yet a case of typhoid fever was reported in a family that had been using the water for only a few months. Upon analysis the water was found to be very badly contaminated and the well was condemned, whereupon the owner came to my office with a big cry about the purity of the water, and how they enjoyed that water so much better than any water they had ever drunk. It was clear and cold and the top around the well was cemented very tightly so that no filth could possibly enter. He loudly proclaimed that these new-fangled ideas about health were all bosh, cost too much money, and declared that the Health Department was created only to supply a few with fat jobs in order to pay off some political score.

Now let us get down to where cost and efficiency play the heavy part in this department. We know how much the department is costing the city, but do you, Mr. Head of the Department, know whether you are running the department so that the men under you are giving the city work equivalent to the amount they receive each month? You know of course, by looking up your statistics, that through your term of office, you have reduced the death rate to a certain degree; at least that is what the figures show, and you may be perfectly satisfied that your work shows for itself; but, do you know just how much your men are able to accomplish? Have you any method by which you can say that your men are giving the work all that is in them? In nine cases out of ten you have no idea as to the amount of efficiency your men are showing.

A city, at a considerable expense, secures the services of an efficiency expert who, after a great deal of work in inspecting the books, makes a report saying that the department shows great results and is therefore highly efficient, and is a paying investment, but he does not show how we may get greater efficiency to a degree of the utmost. That seems to be a point sadly overlooked, and it is left to the department head to work out a method by which he can tell to almost an absolute certainty, the degree of efficiency. That is what happened to the Seattle Health Department, and I believe our method is a very good one. I would like to hear of it being tried elsewhere, or would like to hear of a better one, or one in comparison.

In our division of inspection I realized that it was a most difficult thing to keep track of the men while in the field at work, even though I followed them up and noted their ways of accomplishing results. In most cases everything showed up well, but after considerable study I found that it was next to impossible to judge, from what I saw, and from their daily reports, as to the exact amount of work each man was doing. It therefore became necessary to devise some scheme, or method, whereby we could compare the work of the different men. The result is that we have worked out a system upon a percentage basis and the results so far are very satisfactory.

In explanation of our reporting system I will say that our organization is such that the city is divided into three sanitary districts, over each of which there is a district chief, or assistant to the chief sanitary engineer. These districts are sub-divided, with a man in each sub-division who reports directly to the district chief every day by written report. These reports show what work has been done every day, and from these daily reports the district chief assembles the statistics and makes a written report to the chief sanitary engineer every ten days. At the end of each ten day period a summary of the inspections, complaints, and abatements of nuisances, and each man's daily percentage of the whole, is worked out and platted to a curve, so that we are able at a glance to see just how one man compares with another and what proportion of the work each man does. Everything considered, the method works out very well and enables us to judge whether every man is doing his share, also which are the most efficient. Those who are low are given special attention and instruction; if they still continue to be low, for no reason over which they have control, the weeding out process begins.

Some men are able to handle a great amount of work of a smaller kind, while others are able to handle a large kind of work. In the older part of our business district, which is only a short distance from the water front, the buildings were constructed at a time when no particular attention was paid to sanitation, and no thought given to the possibility of this city ever becoming exposed to, or infected with Bubonic Plague through the medium of the rat. We therefore have found a great many buildings with cellars having wooden floors, which give the rats an ideal place to harbor and breed.

DEPARTMENT OF HEALTH AND SANITATION
CITY OF SEATTLE
DIVISION OF INSPECTION
EFFICIENCY REPORT OF INSPECTORS

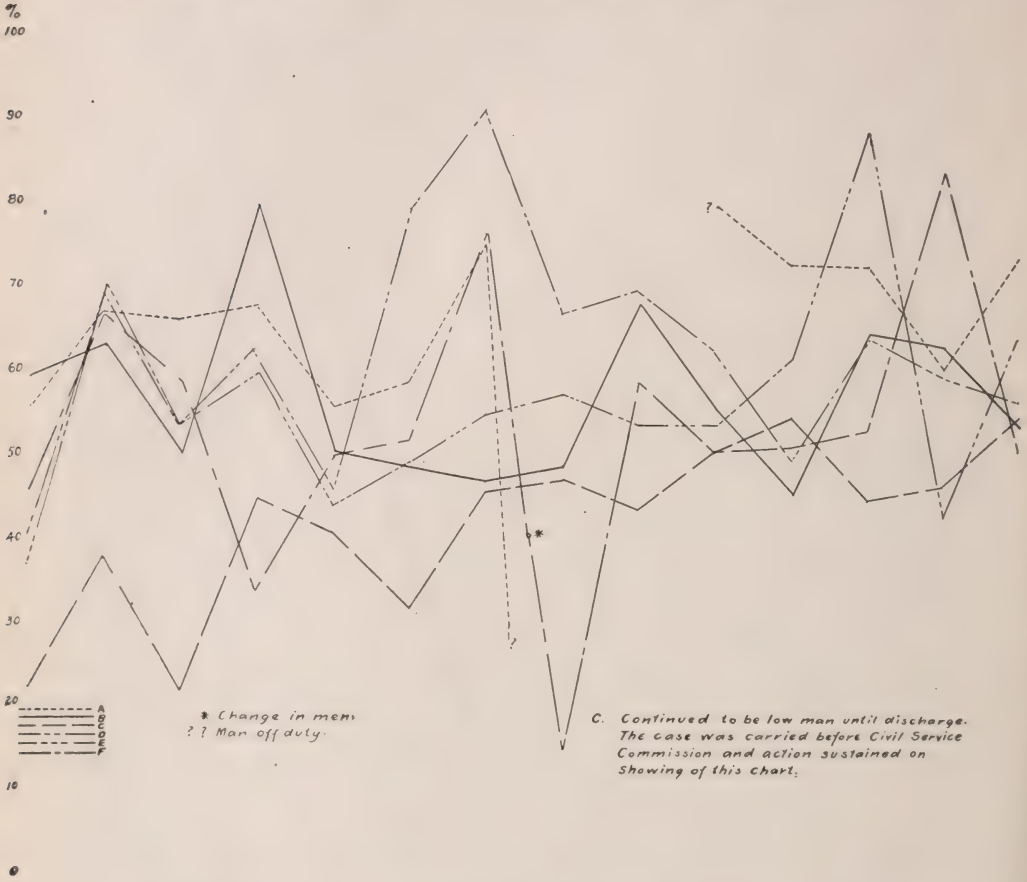
DISTRICT C — 2ND FOUR MONTHS 1912

INSPECTOR	Nº OF DAYS	TOTAL			DAILY AVERAGE			% OF TOTAL			DAILY %		
		INSP	COM	ABTS	INSP	COM	ABTS	INSP	COM	ABTS	INSP	COM	ABTS
A	90½	1716	488	502	18.9	5.39	5.54	25	24	29.8	.28	.27	.33
B	72	1413	439	349	19.5	6.09	4.86	20.6	21.6	20.8	.29	.30	.29
C	92	2098	677	416	22.8	7.35	4.52	30.6	33.3	24.6	.33	.36	.27
D	92	1634	429	418	17.7	4.66	4.54	23.8	21.1	24.8	.26	.23	.27

________________ Ass't Chief.

When it becomes necessary to rat proof a building, one of the first things to do is to tear out the old wooden floors in the cellars and replace them with concrete, thus robbing Mr. Rat of his nice, warm home. This is where the real fine work of the inspector comes in, as in more cases than not, the owner of the building objects to spending any more money on an old building and will stop and argue the matter upon the first approach of the inspector. This is where the result of our efficiency reports shows up. We find that there are some of our men whose percentage is more than average high, therefore we place those men in the district or subdivision in which the so called difficult work is to be done, and we are able to select, before long, the men who are able to get results in the way of abatements, as we term work being done upon order from the Health Department.

We also find that some of the men who hold high percentages in the small work are unable to do nearly as well in the large work. In this way we are able to separate and catalogue each man and place him where



This chart shows by curves, the percentage efficiency of the men in one branch of the Sanitation Department of the City of Seattle. Different colors of ink are used for the different curves on original charts.

This chart is not platted from accompanying report, as the charts are not made unless requested by the Commissioner of Health so that he may see at a glance the comparison between men.

This form represents work done for a period of four months, but can be used in the same way for any length of time. We make them out in our department every month for the three ten-day periods mentioned in the text of this article.

Some of the men thought it was possible to juggle the work in such a way as to beat the system, but were caught at it and we have had no more trouble.

he is the most efficient. Through this careful attention in detail to each man's work, the department of this city is returning to the taxpayer a dollar for every dollar expended in maintaining the Health Department.

I consider that the efficiency of the Health Department of any city is an item which should be given the most careful attention possible. You may say that this is all unnecessary, that your results show the efficiency, which may be true enough, but upon analysis you may find that you might get greater results.

Accompanying are forms, filled out, showing the method in operation in the Health Department of the City of Seattle.

A MEDIUM FOR ISOLATION OF THE COLON GROUP.

FRANK L. RECTOR, B.S., M.D.,
Brooklyn, N. Y.

Read before the Laboratory Section, American Public Health Association, Washington, D. C., September, 1912.

The use of bile, or bile salts in media for the isolation of the colon group of organisms, has now been practised for about twelve years, and its place in the fixed laboratory procedure has been generally established and acknowledged by all workers along these lines.

The use of bile salt (sodium taurocholate) was first proposed by McConkey in 1900. This was followed by Jackson, who in 1906 advocated the use of fresh sterile ox bile to which peptone and lactose had been added. Since that time many modifications of these two substances have been proposed, but all are built upon the use of either the bile or bile salt as the basis. Recently the dried ox bile has been placed upon the market, and so far as the writer is aware, has given satisfactory results. The writer has used both the fresh and dried product in the work in his laboratory, and finding no appreciable difference in their action toward the colon group, has discontinued the use of the fresh bile. The dried product is more easily obtained, is more convenient to use, and has been found no more expensive, taking all points into consideration.

Some experimental work was undertaken this past year to find a more satisfactory medium than litmus lactose agar for the isolation of the colon group from water. The work was interrupted at times, so the studies have not been carried as far as intended, but it is expected that additional work will be done along the lines suggested in this brief report.

As is well known, not all red colonies on litmus lactose agar prove to be of the colon type, and a medium giving a larger number of positive tests is desirable. A medium of the following composition was devised and tested for adaptability to this line of work:

Dried ox bile	10%
Peptone (Witte)	1%
Agar (Shredded)	1.5%
Lactose	1%
Neutral red (1% sol.)	1%
Distilled water	q. s.

The dried bile and peptone are added to the distilled water, boiled and filtered through paper. The agar is then added and heated for one hour in the Arnold steamer. While the agar is dissolving it is well to prepare a filter of cheese cloth and absorbent cotton as proposed by Major Russell of the U. S. Army, and place this in the sterilizer with the bile solution. When the agar is dissolved it is filtered through the cotton, and the lactose, which had been dissolved previously in a small quantity of hot distilled water, is added, also the neutral red solution. After thorough mixing the material is tubed, placing from 6 to 10 cc. in each tube, depending upon the size of Petri dish used, and autoclaved for ten minutes at 12 pounds pressure.

When in tubes, this medium looks quite red, but when placed in Petri plates in a thin layer, it is yellowish brown in color, and more or less opaque. On this medium colon-like colonies produce a distinct purplish red zone, which is characteristic. There is a clear area immediately surrounding the colony, which shades off into the denser medium.

Owing to the inhibitory action of the bile, many bacteria which grow on litmus lactose agar will not grow on this medium.

Plates of bile agar and litmus lactose agar were made from a suspension of horse feces using sterile distilled water as the diluting medium. At the end of twenty-four hours' incubation, 65 colonies, all showing characteristic appearance, were found on the bile agar plates, while 200 colonies, only 40 of which were red, were counted on litmus lactose agar plates. Sub-cultures of various colonies from the bile agar plates showed them to be of the colon group.

A series of 17 cultures isolated at various times from water and one colon culture were inoculated into plates of bile agar and litmus lactose agar. Only 8 of the 18 grew on bile agar, and only two of these gave typical colonies on the plates. One of these was the colon which has been isolated from feces and the other was a member of the group isolated from a municipal water supply. Nine cultures, only two of which were of the colon group, gave a red growth on litmus lactose agar plates.

Samples were collected from two city supplies, and two spring supplies. One city supply was excellent, while one frequently showed colon in 1 cc. quantities. One spring was located in the country far removed from contamination, while the other was situated in a small village and subject to contamination.

Samples from the good city supply showed no growth at 37° C on bile agar, and only occasionally on litmus lactose agar, and then no red colonies. From the other city supply only 33 per cent. of the colonies developing on litmus lactose plates were red, while on bile agar plates over 69 per cent. of colonies developed were red.

No growth on either litmus lactose or bile agar plates was obtained from the safe spring.

Of the samples from the other spring 20 per cent. of colonies on litmus lactose were red, while 100 per cent. of those obtained on bile agar were characteristic of colon.

Twenty-nine cultures, not all of which were characteristic of colon, were taken from the bile agar plates and sub-cultured into milk, neutral red lactose, Dunham's solution, nitrate broth, and gelatine. When gas was produced in the lactose, milk coagulated, indol and nitrites produced, and gelatine not liquefied in ten days, the test for colon was considered positive. Of these 29 cultures, sixteen, or 55 per cent. were of the colon group. At the same time 38 cultures were taken from the litmus lactose agar plates and tested in a similar manner. Only 7, or 18.4 per cent., were colon.

Of these 67 cultures, 9 were cocci, 3 of the 9 being streptococci. These 3 gave a red growth on bile agar, but the characteristics which distinguished the colon group on this medium were absent. The colonies were much smaller than colon, and the color reaction not so pronounced.

The writer is aware that this use of bile or bile salts as a direct plating medium is criticised on account of its inhibitory action on weak and attenuated colon; but it seems that the number and vitality of these organisms in a water should be considered, rather than their mere presence. If strains of this organism are present in such a weakened and changed condition that they will not grow on bile media fortified by lactose and peptone, their sanitary significance is diminished to a marked degree, since it is recognized that the colon is more hardy than the typhoid and other pathogenic organisms occasionally found in water. If the colon is so weakened as to need rejuvenation before being demonstrable there is little danger from typhoid and other pathogens.

CONCLUSIONS.

Not all red colonies on litmus lactose agar are colon.

A medium of the composition suggested inhibits many forms seen on litmus lactose agar, and gives a larger percentage of colon organisms.

In the work so far reported on, 55% of the colonies from bile agar were positive for colon as against 18.4% of those on litmus lactose agar.

A PLAN FOR THE REORGANIZATION OF THE PUBLIC HEALTH SERVICE IN THE STATE OF NEW YORK.*

CHARLES FREDERICK BOLDUAN, M.D.,
Assistant to the General Medical Officer, Department of Health,
City of New York.

Those who have come into intimate contact with public health administration in the state of New York have long realized that, apart from a few large cities, the method of organization and the results achieved were not at all what they should be and that the State Department of Health was powerless to carry out much needed reforms. Some of these defects were realized by the local health officers themselves and during the previous session of the legislature the legislative committee of the State Sanitary Officers' Association secured the passage of a bill whereby it was hoped to strengthen the power of the local health officers. The bill, however, failed of enactment because of the governor's veto.

The science of public hygiene has developed enormously in recent years, even more, perhaps, than any other branch of medicine, and it is illogical to expect, as we now do, that the local practising physician, busy with all the details and worries of a general country practice, shall keep in touch with the achievements of modern public health work. In addition to this, and here is the crux of the matter, his status as a practising physician in the community often places him at a decided disadvantage in the enforcement of proper public health measures. The result is that rural public health administration in this country is, to a large extent, inefficient. What is needed is a radical reform of our present method of organization; we should have trained officials sufficiently paid to obviate the necessity of their practicing and each administering with broad powers, a given district. This method of administration has been attended with pronounced success in Germany and England and there is no reason why it cannot be adapted to work equally well here. In fact, as will be seen from a study of the following pages, we can improve on the English plan by providing for a uniform set of rules throughout the state, in place of local ordinances.

At the present time public health administration in the State of New York is based on town and village organization. By the public health law, these municipalities are directed to organize boards of health. The law further directs these local boards of health to "make and publish from time to time all such orders and regulations as they may deem necessary and proper for the preservation of life and health, and the execution and enforcement of the public health law of the municipality" . . . further "Every such local board shall prescribe sanitary regulations for the burial and removal of corpses, and shall designate the persons who shall grant permits for such burial, and permits for the transportation of any corpse . . . etc." further . . . "Every such local board of health shall guard against the introduction of contagious and infectious diseases by the exercise of proper and vigilant medical inspection and control of all persons and things arriving in the municipality from infected places, or which from any cause are liable to communicate contagion." Further "Whenever such local board shall determine that any accumulation of water wherein mosquito larvae breed, constitutes a nuisance," . . . etc. "the owners of the premises shall bear the expense of its suppression, or so much of it as the local board may have determined to be equitable as hereinafter provided" . . . "If in any case the owner of the premises shall not, within a reasonable length of time, proceed to suppress or remove such breeding place, the local board may proceed to suppress and remove the same, and . . ."

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*This plan was presented by invitation before the Special Health Commission appointed by the Governor of the State of New York to inquire into the health conditions and administration of the State and to make recommendations looking toward improvement and greater efficiency.

The State Health Department has also prepared "Sanitary Regulations" which are "Recommended for adoption by local boards of health." Attached to these is a note, reading:—"Every local board of health should adopt such sanitary regulations as are necessary to carry out the provisions of the Public Health Law, and may adopt any ordinance required by local conditions to protect the public health. A fixed penalty should be stated in every case."

It is to be observed that although the Public Health Law places the main part of public health administration, including the making of regulations, in the hands of the local authorities, it contains definite *state* laws on certain subjects. Thus it forbids manufactures in eating and sleeping rooms in tenements. "No room or apartment in a tenement house, used for eating or sleeping purposes, shall be used for the manufacture, wholly or in part, of coats, vests, trousers, knee-pants, overalls, cloaks, shirts, purses, feathers, artificial flowers, or cigars, except by the members of the family living therein. . . . etc." The enforcement of this law is in the hands of the local board, or an inspector appointed by such board.

There is also a *state* law for the control of foods and adulterations. The enforcement of this is kept in the state health department, which turns the violations over to the district attorney of the county in which the violation occurred, who is directed to commence proceedings for the indictment and trial of the accused.

Bovine tuberculosis and glanders, which were formerly looked after by the state health department, are now supervised by the *State* Department of Agriculture.

The state health department has also adopted certain laws for the protection of water supplies. But the enforcement of these is left to the local boards of health, who, after securing certain proofs from the State Commissioner of Health must bring an action in a court in the county in which the nuisance exists. The action is for penalty and for an injunction.

There is a *state* vaccination law, the enforcement of which is really in the hands of the school authorities.

There is a *state* law for the examination and quarantine of children admitted to institutions for orphans, destitute or vagrant children. This provides also for reports by institutions to the local boards of health.

There is a *state* law regarding the sale of opium, morphine, cocaine and chloral. It does not state who is to enforce this law.

The Penal Code (*state* law) contains paragraphs concerning public nuisances, violations of quarantine regulations, food adulterations, false labels, skimmed milk, etc.

There is a *state* law regarding the employment of women and children in factories. Enforcement rests with the local health authorities.

Granted, then, that greater centralization of public health administration is desirable, how shall we proceed? And assuming for the present that a uniform state health law has been enacted, to whom shall be left the enforcement of its provisions? The simplest plan which suggests itself is perhaps one of districting the state and giving each district in charge of a District Health Officer, appointed by a State Health Commissioner, and subject to the latter's proper orders. The districts could be formed on the basis of population, and might consist of groups of towns, or individual counties, or groups of counties, being arranged with an eye to ease of administration, geographical situation, community of interests, etc. The good points of such a plan are apparent, centralized administration is assured and the financial problem is simplified since the District Health Officers would be paid out of the state treasury. On the other hand, it leaves unsolved an important question, namely, who shall make the state public health laws. Shall this be left to the state legislature, or shall it also be centralized and lodged with the State Health Commissioner, or with a small State Board of Health consisting of appointed officers? Moreover, it leaves the local communities without any direct voice in their health administration, thus going to the other extreme of present conditions. It seems to me that an effective middle road can be chosen, and that ample centralization of authority can be obtained even with a certain degree of local participation. The plan I have developed is as follows:

The unit of public health administration should be the county, and the execution of state public health laws should rest with the "County Health Officer." (See below.) To begin, a set of rules and regulations should be drawn up, and enacted as the public health laws of the entire state. These should prescribe minimum requirements and provision should be made to permit the enactment of additional requirements for local needs.

All the present village and town boards of health should be abolished. There is no reason why the laity should be formed into boards of this kind; the problems that arise are mainly public health problems, about which they can have no real knowledge and in which their judgment, at the present time, is, therefore, often incorrect. Moreover, in many of the towns and villages, this will at once effect a considerable saving, for some of the boards hold monthly meetings and the members attending are paid as high as two dollars for each meeting. With ten members this amounts to $240 annually. In other towns in the state conditions are quite the reverse, and there are, I am told, local boards which hold but one session a year and sometimes not even so often.

Practically all the powers and duties of the present local boards of health should be transferred to the new official, the County Health Officer, whose qualifications, mode of appointment, powers and duties will be described below.

The present local village and town health officers would be retained and while their title and duties would be somewhat similar to those they now have, they would be responsible to the County Health Officer and would carry out his orders. In addition to their present duties, the local health officers would be charged with the medical examination of all the children attending school in their respective districts. Every child should be physically examined once each year and a continuous record should be kept of such examinations. Just how best to compensate the local health officers is a very difficult matter to solve. It seems illogical to pay them directly in proportion to the number of cases of contagious and communicable diseases occurring in their district, for this seems like placing a premium on disease. But it is equally unfair to pay them a flat salary and expect them to handle a very large number of cases at a very low rate. At the present time the compensation is almost entirely on the fee basis, the local health officer charging the ordinary rates paid for private calls. Many of the local health officers are allowed five dollars for each disinfection. It would seem advisable to combine a minimum salary with fees for all visits, both medical and sanitary. The present law, requiring the payment, by the town or village, of the health officer's proper expenses for attendance at the annual conference of health officers is excellent and should be retained in any plan adopted. The local health officer would, as now, be appointed by the village or town board and his term of office would be four years.

Since the main object of the plan is to strengthen the hands of the public health officials, it is important to consider carefully the best way of appointing or electing the County Health Officer. The advocates of centralization would have him a state instead of a county official and so would lodge this power with the State Commissioner of Health, a plan which would undoubtedly make for independence on the part of the County Health Officer. On the other hand, there are many who insist that this is a violation of the principle of home rule; they would give the appointing power to the boards of supervisors. I feel that the latter plan is entirely feasible providing that County Health Officers must have certain qualifications attested to by the State Board of Regents. By then making them directly responsible to the State Commissioner, the chief public health executive of the state, sufficient centralization of authority would easily be effected.

Right here I should like to say a word about the initiation of the plan. At the present time, there are some 1400 local health officers, many of them conscientious public health workers and some of them undoubtedly men of considerable talent in public health administration. Since there are, at the present time, practically no candidates available having a Diploma in Public Health, it would seem proper to provide, that, immediately after the passage of this act, the State Board of Regents should arrange for and hold an examination for the Diploma in Public Health. This examination should be open to all the 1400 present local health officers, to former health officers and to others having experience in public health work. Record and experience should be given due weight in marking the candidates. The aim should be to provide by this examination only just about enough licensed health officers as would be sufficient to fill the various positions. Since the term of office of the County Health Officer would be six years, arrangements might meantime be made with some of the recognized medical schools to give courses preparing the candidates to pass the future examinations for a Diploma in Public Health. In other words, in the beginning, I would artificially create a body of licensed health officers by granting a Diploma in Public Health to all who passed the examination; afterwards a definite course in a medical school would be required of candidates taking the examinations. This would not only solve a vexing problem but would also provide a body of practically trained public health officials familiar with local needs. Moreover, by filling the initial County Health Officerships from the ranks of the present local health officers, the coöperation of these 1400 officials would probably be assured, a matter of no little moment.

To return now to the qualifications and duties of the County Health Officer. This official should be a physician specially trained in public health work and holding a Diploma in Public Health from the State

Board of Regents, or from some school recognized by the regents as granting its equivalent. He should be appointed by the Board of Supervisors, hold office for six years and be removable by the State Commissioner on charges. He would be paid a fixed salary out of the county treasury, and be prohibited from privately practicing medicine. In all public health matters he would be subject to the proper orders of the State Commissioner of Health and he would be required to faithfully execute the public health laws and regulations in his county. He should be empowered, in times of threatened epidemic, to contract proper debts for the conduct of his work, provided this action has the approval of the State Health Council. Such debts should then constitute a proper charge against the county treasury. There should be some provision whereby the county Health Officer can constantly know just what is going on about him, and all returns of communicable diseases should therefore pass through his hands. Moreover, the diagnosis laboratories should regularly send to the County Health Officers a list of communicable diseases coming to its notice in their respective counties. Finally, the State Registrar of Vital Statistics should send monthly statistical analyses concerning conditions in the counties, to each County Health Officer, to the end that the latter may direct his work to the best advantage. This arrangement would permit the enactment of the model registration law devised by Dr. Cressy Wilbur, of the United States Census Bureau.

Among the duties of the County Health Officer should be that of providing facilities for the prompt performance, for physicians, of the ordinary diagnostic laboratory tests. Whether this would necessitate the appointment of an additional part-time or full-time physician would depend on circumstances. The maintenance of a sufficient force of assistants to properly carry on the work of the office should be controlled by the State Health Council, to be described.

The county health officer should also supervise the work of the medical school inspection but the actual examinations would, of course, be made by the local health officer.

Provision should be made to give the County Health Officer complete charge over certain hospital facilities for the purpose of properly isolating contagious diseases. Perhaps this can be worked out in connection with the tuberculosis hospitals which the counties are now empowered to establish. A part of the beds in these tuberculosis hospitals should be under the sole control of the County Health Officer, at least, in so far as forcible retention is concerned. Whether or not the County Health Officer should have complete charge of the county tuberculosis hospital, is debatable.

Whatever orders are to be issued should be issued by the County Health

Officer, or in his name, and he should be protected by the county in all suits for damages. Provision should be made for securing for him, at any time, expert legal advice as to any action he may desire to take. This would probably be best arranged by placing the services of the District Attorney at his disposal in case of need.

Cases of smallpox, and the like, should be cared for by the County Health Officer, or his assistants. This would be far preferable to the present practice of having such cases cared for by the local health officer, who at once loses all his private patients for the time being.

I feel strongly that somewhere in this reorganization of the public health service there should be lodged wide powers, so that the duly constituted health authorities may effectively cope with disease. We have already seen that it is inadvisable to lodge this power with the local authorities and there is moreover very great need of securing uniform effective health regulations throughout the state. Following the spirit of our republican institutions, I at first thought to give this power into the hands of a representative body composed of all the county health officers, all the city health officers, and the State Commissioner of Health. This body, however, proved to be so large that it would probably have been unwieldy; moreover, there was some question as to whether a body made up entirely of physicians should be given such broad legislative powers. It seems to be better, therefore, to restrict the legislative powers to a smaller body, "The State Health Council," composed of the following:

The State Commissioner of Health, presiding,
The State Commissioner of Labor,
The President of the State Board of Charities,
The Commissioner of Health, or the General Medical Officer, of the City of New York,
The Health Officer of the Port of New York,
Two County Health Officers, } elected by the Annual Conference of
Two City Health Officers } County Health Officers.

This "State Health Council" would hold monthly meetings and would be the supreme public health authority of the state.

It will be noticed that the "Council" is composed of both physicians and laymen and combines the heads of various state departments having in some way to do with the health conditions of the people. A word may be said concerning the State Labor Commissioner. In the State of New York, the Department of Labor deals with a wide range of functions relating to the supervision of conditions of labor. Among the functions relating to industrial hygiene have been included a number which really belong to the Department of Health. In the new state health law the province of the state labor department should be clearly defined, to the end that duplication of effort be avoided. It seems to me that a division of function can easily be effected by giving to the health department all questions dealing with clearly preventable diseases, while reserving to the labor department the control of conditions interfering with efficiency, and the prevention of bodily injury and death. The health department would thus deal with the control of infectious and industrial diseases, dust removal, etc., while the labor department would take up fatigue, hours of labor, lighting and ventilation of workshops, safety devices, child labor, etc.

The supreme public health authority in the state would be this State Health Council. The Council should have "power to make rules and regulations embracing all matters to which and so far as the power and authority of the county health officers extend not limiting their application to the subject of health only."* But no such enactment should take effect until the same had been published in certain designated newspapers.

Subject to the rules and regulations of the State Health Council, the administration of the state health service should be vested in a State Commissioner of Health appointed by the governor by and with the advice and consent of the senate. He should be a physician, a graduate of an incorporated medical college, of at least ten years' experience in the actual practice of his profession and of skill and experience in public health duties and sanitary science. The term of the State Commissioner of Health should be six years and he should receive an annual salary of ten thousand dollars and his expenses actually and necessarily incurred in the performance of his official duties, to be paid monthly on the audit of the comptroller. He would be empowered to employ such clerical and other assistants as were necessary for the proper performance of the powers and duties of the department provided that the positions to which these were appointed had been previously created by the State Health Council, or by the provision of this act.

The State Commissioner of Health should take cognizance of the interests of health and life of the state and of all matters pertaining thereto. He should make inquiries in respect to the cause of disease, especially epidemics, and investigate the source of mortality and the effect of localities, employments and other conditions upon the public health. He should obtain, collect and disseminate such information relating to mortality, disease and health as may be useful in the discharge of his duties or may contribute to the promotion of health or the security of life in the state. He should cause to be prepared and shall submit to the Council any information which the Council may request as necessary for its guidance in its duties. As chief executive of the state health service, he shall faithfully carry out the directions of the State Health Council, and those of the Health Council. He should see that the State Health Regulations and all County Health Regulations are properly enforced and if need be, he would call on the governor who should thereupon use the powers at his disposal in order to enforce such regulations and laws. In case of need, and with the approval of the Health Council and of the governor he might contract debts in the proper performance of his duties, which debts should be a charge on the state treasury.

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* This valuable clause is adapted from the law under which the Board of Health of the City of New York exercises its various powers.

Among the duties devolving on the State Commissioner of Health should be the collection, tabulation, and publication of vital statistics. The provisions for carrying out this important work should be practically all of those of the model law devised in the U. S. Census Bureau.

No one who is familiar with the situation will question the propriety of entirely excluding the City of New York from any control by the State Council, while still giving the city a voice in the latter's deliberations. Even as an abstract proposition this exception is based on sound public health principles.

Since the results of improved rural public health administration benefit the large cities out of proportion to the rest of the state, it has generally been recognized as proper to reapportion the charge for rural health service so that in many instances only a small part of the expense is actually borne by the county in question, the rest being borne by the state at large. The principle of this method has been adopted in Great Britain. It seems to me that some means should be provided whereby even the very sparsely populated counties, or the counties with a very small assessed valuation should be able to maintain highly efficient public health administrations. In order to distribute the burden as equitably as possible and also in some measure in proportion to the distribution of the benefits derived, I have based a redistribution of the expense of county administration on the assessed valuation of the various counties. This can be seen from a study of the following table: Thus

Assessed valuation	Under	$10,000,000	the state	bears	9/10
$10,000,000	to	20,000,000	"	"	8/10
20,000,000	"	30,000,000	"	"	7/10
30,000,000	"	40,000,000	"	"	6/10
40,000,000	"	50,000,000	"	"	5/10
50,000,000	"	60,000,000	"	"	4/10
60,000,000	"	70,000,000	"	"	3/10
70,000,000	"	80,000,000	"	"	2/10
80,000,000	"	90,000,000	"	"	1/10
Over $90,000,000 valuation			"	"	nothing

The population of the State of New York is very close to ten millions and of these about seven millions live in incorporated cities. Approximately three million inhabitants would thus be under the supervision of the state health authorities with its 1400 local health officers. Insisting on a physical examination of every school child once each year as one of the duties of the local health officer, it may be well to see how many school children there are in this population of three million. In the city of New York the total enrollment of children in the public schools is 675,000 and in the parochial schools 135,000, a total of 810,000 out of a population of five millions. For three million people this would mean 486,000 and dividing by 1400, the number of local health officers, we find that each health officer would supervise approximately 350 school children, the village health officer usually more, the town health officer less. Under the circumstances it might be feasible to pay the local officer say fifty cents for each child examined, the money to come out of the county treasury in order to effect an equitable distribution of the charge.

The local health officer should also be paid a per capita fee based on the population in his district. Inasmuch as the increased work demanded by village communities in proportion to their population is counterbalanced by the distance travelled in reaching all parts of a township, it seems to me that no distinction should be made in the per capita rate of the two communities. A sliding scale should however be provided and a minimum lump sum per annum specified, somewhat along the following lines:

In villages or townships with 500 to 1000 people, 20 cts. per capita.
1000 to 2000, 20 cts. first 1000, and 10 cts. for all over.
2000 to 3000, 15 cts. first 2000, and 5 cts. for all over.
3000 to 4000, 12 cts. first 3000, and 4 cts. for all over.
4000 to 5000, 10 cts. first 4000, and 2 cts. for all over.
5000 and over, 8 cts. per capita.

No local health officer should receive less than $100 annually exclusive of all other fees (school, lunacy, labor, etc.).

It is very difficult to estimate the increased cost of the health administration here outlined, for the reason that so little is known concerning the present cost of administration. We have already noted that the unit of health administration in this state is the city, town or village board of health. These boards are a law unto themselves and there is the greatest diversity in their make-up as well as in their compensation. In some communities the members of the board of health serve without pay and the health officer is either paid a salary or works on a fee basis; in other communities the members of the board of health receive a fee for each meeting attended, the fee varying from two to five dollars. Here too the health officer may receive a salary or work on a fee basis. The number of members of the health board is also subject to variation, though commonly the board numbers from six to ten members. The following table is of interest.

Expenditures of Certain Towns in Westchester County, N. Y., 1911.

Town	Total spent for health work	Of which, paid to members for attending board meetings
Greenburgh	$667.43	$236.00
Cortland	1373.00	408.00
Harrison	820.00	70.00
Mamaroneck	318.00	206.00
Ossining	840.00	96.00
Rye	400.00	58.00
Scarsdales	461.00	126.00
White Plains	547.00	304.00
	$5426.43	$1504.00

When we recall the functions of the present local boards of health, it will be seen that here we already have $1500 toward the maintenance of an efficient county health administration. It must at once be stated, however, that in some counties, not a single local board of health pays its members for attending meetings. Thus, in Washington County, with a population of 47,778, a total of $1877.00 was expended for public health work by the various local boards and none of this was spent on meetings.

So far as the expense to the local community or county is concerned, we must first determine the average number of people under the supervison of the local health officer. Dividing three millions by 1400, gives an average population of 2143. According to the scale of fees shown on a previous page, this would mean about $300 per annum for each local health officer. In addition to this, he would receive 50 cents for the examination for each school child, or $160 for the estimated 320 children in his community; and the county would pay him the usual fees for the examinations made in lunacy cases. Moreover, he would receive as now, the usual fees for visits paid to cases of contagious diseases and the state would pay him the small fees now paid for reporting vital statistics and contagious diseases. Altogether he might have an income, from the sources enumerated, of about $500 to $600 per annum; it would probably never be less than $150 even in the most sparsely settled communities. So far as can be judged from the meagre data available, the local communities would have to spend three or four times what they now do on public health work. While this may appear a large sum, it is only so because of the utterly inadequate expenditures heretofore made for this important work, expenditures entirely out of proportion to the population when measured by accepted standards. Thus, New York City spends annually over seventy cents per capita on its health work and this does not include the removal of garbage and ashes, or street cleaning, or sewage disposal.

The plan here outlined provides for a local expenditure of probably less than one-third that made in New York and carries with it the assurance of effective prevention of disease and the reduction of the death rate. That the money spent would represent a good investment is evident to anyone who examines into present conditions and realizes the economic importance of health work.

APPENDIX.

The following is a list of the incorporated cities in the State of New York. It will be noted that many of them have but several thousand inhabitants. The exception of these from the plan above outlined is due to certain difficulties which, I understand, would arise owing to the rights granted to these cities under their charters. Personally, I feel it would be preferable if the plan could be applied to all except the large cities, say all the towns, villages and cities, excepting cities of a population of 100,000 or over.

INCORPORATED CITIES, NEW YORK STATE.

City	*Population 1910*	*City*	*Population 1910*
Amsterdam	31,267	New Rochelle	28,867
Auburn	34,668	Newburgh	27,805
Binghamton	48,443	Niagara Falls	30,445
Cohoes	24,709	North Tonowanda	11,955
Corning	13,730	Ogdensburg	15,993
Cortland	11,504	Olean	14,743
Dunkirk	17,221	Oneida	8,317
Elmira	37,176	Oneonta	9,491
Fulton	10,480	Oswego	23,368
Geneva	12,446	Plattsburgh	11,138
Glens Falls	15,243	Port Jervis	9,564
Gloversville	20,642	Poughkeepsie	27,936
Hornell	13,617	Rensselaer	10,711
Hudson	11,417	Rome	20,947
Ithaca	14,802	Schenectady	72,826
Jamestown	31,297	Tonawanda	8,290
Johnstown	10,447	Troy	76,813
Kingstown	25,908	Utica	74,419
Lackawanna	14,549	Watertown	26,730
Little Falls	12,273	Watervliet	15,074
Lockport	17,970	Yonkers	79,803
Middletown	15,313		
Mt. Vernon	30,919		1,081,076
Cities of over 100,000—1910		Buffalo	423,715
New York City	4,766,883	Rochester	218,149
Manhattan	2,331,542	Syracuse	137,249
Bronx	430,980	Albany	100,253
Brooklyn	1,634,351		5,646,249
Queens	284,041		
Richmond	85,969	Population, incorporated cities, 1910	6,727,325

THE COUNTIES OF NEW YORK STATE, SHOWING AREA, POPULATION, ASSESSED VALUATION, AND THE CITIES CONTAINED THEREIN.

County.	Area in Sq. M.	Population, 1910.	Assessed Valuation.	Cities.
Albany	499	173,666	$120,100,000	Albany, Cohoes, Watervliet
Alleghany . .	1,060	41,412	21,300,000	
Broome	685	78,809	42,000,000	Binghampton
Cattaraugua	1,356	65,919	32,500,000	Olean
Cayuga	773	67,106	42,400,000	Auburn
Chatauqua .	1,020	105,126	55,200,000	Jamestown, Dunkirk
Chemung. . .	436	54,662	24,700,000	Elmira
Chenango . .	854	35,375	19,500,000	
Clinton	995	48,230	15,300,000	Plattsburg
Columbia . .	691	43,658	27,200,000	Hudson
Cortland . . .	480	29,249	16,300,000	Cortland
Delaware. . .	1,557	45,575	19,900,000	
Dutchess . . .	853	87,661	59,100,000	Poughkeepsie
Erie	996	528,985	404,500,000	Buffalo, Tonawanda
Essex	1,667	33,458	17,400,000	
Franklin . . .	1,783	45,717	16,700,000	
Fulton	567	44,534	18,200,000	Johnstown, Gloversville
Genesee	497	37,615	29,500,000	
Greene	600	30,214	16,200,000	
Hamilton . .	1,767	4,373	4,900,000	
Herkimer . .	1,459	56,356	30,700,000	Little Falls
Jefferson . . .	1,147	80,296	50,200,000	Watertown
Kings	37	1,634,351	1,412,200,000	Brooklyn
Lewis	1,294	24,849	12,000,000	
Livingston. .	644	38,037	29,600,000	
Madison . . .	628	39,289	21,500,000	Oneida
Monroe	721	283,212	216,700,000	Rochester
Montgomery	396	57,567	31,100,000	Amsterdam
Nassua	352	83,930	117,900,000	
New York. .	40	2,762,522	5,352,500,000	New York
Niagara	504	92,036	69,800,000	Niagara Falls, Lockport, N.Tonawanda
Oneida	1,196	134,157	75,500,000	Utica, Rome
Onandaga . .	824	146,247	145,500,000	Syracuse
Ontario	674	52,286	39,800,000	Geneva
Orange	791	115,751	56,200,000	Newburgh, Middletown, Port Jervis
Orleans	399	32,000	21,900,000	
Oswego	962	71,664	34,000,000	Fulton, Oswego
Otsego	956	47,216	25,500,000	Oneonta
Putnam	241	14,665	14,800,000	
Queens	58	184,041	334,900,000	New York (Borough of Queens)
Rensselaer. .	643	122,276	81,500,000	Troy, Rensellaer

ASSESSED VALUATION—*Concluded.*

County.	Area in Sq. M.	Population, 1910.	Assessed Valuation.	Cities.
Richmond . .	61	85,969	68,100,000	New York (Borough of Richmond)
Rockland . .	200	46,873	29,800,000	
Saratoga . . .	800	61,917	32,200,000	
Schenectady	200	88,235	60,600,000	Schenectady
Schoharie . .	647	23,855	12,500,000	
Schuyler . . .	335	14,004	8,500,000	
Seneca	346	26,972	17,600,000	
Steuben	1,490	83,362	45,100,000	Corning, Hornell
St. Lawrence	2,880	89,005	49,000,000	Ogdensburg
Suffolk	1,200	96,138	95,600,000	
Sullivan	1,082	33,808	11,000,000	
Tioga	542	25,624	14,600,000	
Tompkins . .	494	33,647	20,300,000	Ithaca
Ulster	1,157	91,769	31,700,000	Kingston
Warren	940	32,223	15,800,000	Glens Falls
Washington.	861	47,778	23,300,000	
Wayne	621	50,179	30,700,000	
Westchester.	463	283,055	332,200,000	Yonkers, Mt. Vernon, New Rochelle
Wyoming . .	606	31,880	19,600,000	
Yates	342	18,642	12,200,000	
	47,620	9,113,279	$10,121,277,000	

A COMPARISON BETWEEN THE SAND FILTRATION METHOD AND THE BUBBLING METHOD FOR ENUMERATING BACTERIA IN AIR.

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Read before the Laboratory Section, American Public Health Association, Washington, D. C., September, 1912.

Rettger has described in the *Journal of Medical Research* (N. S. v. 22, p. 461) a method for enumerating bacteria in air whereby a measured volume of air is drawn through 5 cc. of physiological salt solution, and portions of the liquid subsequently plated for counting. He made no comparisons with other methods, but showed that when the air was drawn through two tubes connected tandem, very few or no bacteria passed into the second tube.

To compare the results obtained by this method with the results obtained by the sand filtration method, we have made a number of parallel tests. Each of us worked independently, devising his own apparatus and technique; and the results were finally compared. In consequence of this plan the details of making the trials differed slightly, but we were led to essentially the same conclusions.

The apparatus, as devised by Rettger, consists of a glass tube with a small round bulb at one end. The bulb has eight or ten small perforations which allow the air to be passed at a rapid rate and yet divide it to such an extent that absorption of dust and bacteria is complete. This glass tube, or aëroscope, is fitted into a small, heavy-walled test tube by means of a rubber stopper which bears also a short glass tube bent at right angles. The upper end of the aëroscope is bent at an angle of 45 degrees to protect it from the direct settling of bacteria and dust. After addition of the salt solution, the entire apparatus is sterilized in the autoclave for fifteen minutes. The tubes, when not in use, are protected from contamination by cotton plugs.

The sand filters consist of a glass tube 15 mm. in diameter and 70 mm. long, in each end of which is placed a perforated rubber stopper. Through one stopper a glass tube 6 mm. in diameter and 40 mm. long is passed until flush with the smaller end of the stopper. The other stopper is fitted with a similar sized tube, the outer end of which is bent at an angle of 45 degrees. This tube is the top of the filter, and serves to protect it from the direct settling of dust.

Over the lower stopper is placed a bolting cloth disc which has been cut slightly larger than the end of the stopper so that it may be turned down between the stopper and the filter tube and held securely in place. The filtering material consists of a 10 mm. layer of sand which has been passed through a hundred mesh and retained on a two-hundred-mesh sieve.

TABLE NO. I.

(Results obtained by Weinzirl.)

Trial.	Sand Filter.		Water Filter.		Time for 8 Liters.	Excess for Sand.	Excess for Water.
	1st.	2d.	1st.	2d.			
3	367		220		10	156	
4	30		26		8	4	
5	27		34		10		7
6	98		26		8.5	72	
7	176		154		9.5	22	
8	6		2		10	4	
9	141		87		8.5	54	
10	22		223		11		201
11	477		47		8.5	443	
12	54		88		10.5		34
13	52		71		10.5		19
14	31		46				15
15	172		86		11	86	
16	119		161		9		42
17	40		38		9	2	
18	222		284		10		62
19	5	0	23	3	7		18
20	71	0	130	2			59
21	25	0	41	0	10		16
22			219	3	6		
23			123	8	8		
24			90	2	10.5		
25			118	0			
26			50	1.5			
27			39	1.5	8		
28			19	0	8		
29			0	0			
30	0	0					
Total excess						843	473
Number of excesses						9	10

To convert figures to bacteria per liter multiply by $\frac{5}{8}$

In the trials the filter tube openings were as nearly together as possible, being usually an inch or less, and both the aëroscopes and sand filters were used tandem. The bacteria were supplied by beating cloths which had been rubbed over the laboratory floors and steps. Eight-liter, graduated bottles were used as aspirators, the rates of filtration being equalized by means of screw clamps applied to the siphons. It was difficult to maintain exactly uniform rates of filtration, but care was taken to obtain as nearly uniform rates as possible before the air was charged with dust.

The results obtained are shown in detail in the following tables. Our results agree fairly well, although one of us (Weinzirl) secured almost an equal number of excesses by each of the methods, while the other obtained higher counts by the sand filters only. Weinzirl obtained an average of 113 bacteria by the sand filter and 94 by the aëroscope; and Thomas secured 595 bacteria by the sand filters and 349 by the aëroscopes.

TABLE NO. II.

(Results obtained by Thomas.)

	Sand Filter.		Water Filter.		Liters Filtered.	Time in Minutes.
	1st.	2d.	1st.	2d.		
	375	4	180	5	8	15
	150	8	150	6	8	22
	210	4	90	5	8	17
	250	2	60	2	5	12
	315	25	275	15	8	14
	340	0	170	1	8	16
	620	0	250	5	6	13
	210	3	160	1	5	9
	475	9	475	8	8	17
	1,500	2	725	3	8	13
	2,100	10	1,300	5	7	14
Total	6,545	67	3,835	56	–	—
Average...	595	6	349	5	–	—

A third tube (an aëroscope) in the sand filtration showed no bacteria in the first two tests.

As the excesses are not large, and as the second tubes show only small numbers of bacteria, the two methods compare favorably so far as accuracy is concerned. The question then resolves itself largely into one of comparative convenience of the two methods. While it is somewhat easier to make plates from the water tubes, we find the sand filters in every other way easier to operate. The aëroscopes are more difficult to make, or more expensive if purchased; they are more easily broken; and when being handled, they frequently get out of order. Again, sand filters, if protected, may be used some time after being sterilized, while the aëroscopes tend to lose water by evaporation during sterilization and storage, thus vitiating the accuracy of the work. In actual sanitary work, when many samples are to be taken, and at a distance from the laboratory, we believe that the aëroscopes would give more trouble than the sand filters. Although no work has been done to confirm the belief, it seems not improbable that under certain conditions the absorption of sulphur dioxide or other gases in the five cc. from ten or twenty liters of air might have a restraining action upon the growth of some of the organisms absorbed.

THE EFFECT OF FREEZING UPON TYPHOID VACCINE.*

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Read before the Laboratory Section, American Public Health Association, Washington, D. C., September, 1912.

Since the strength of biological products intended for prophylactic and therapeutic use is affected by the conditions under which they are kept after their preparation, a knowledge of the changes that may occur is of great importance.

Heat, light and age are the common causes of deterioration, while the most favorable factor in the preservation of strength is cold in direct ratio to its degree. Some products change very slowly; others rapidly, even when kept under the best conditions.

Such facts have been largely obtained by a study of the changes in the value of antitoxic serums, these being susceptible of accurate standardization. With regard to the effect of heat, light, age, etc., upon bacterial suspensions we can reason only by analogy, for up to the present time very little work of this kind has been done with them.

Lamb and Forster† suggested a method for the standardization of typhoid vaccine. This was based upon the quantity of the vaccine required to fix the normal bacteriolytic amboceptor in a definite quantity of goat serum. Since only materials containing no antiseptic can be used in such a test the field of its application is very narrow.

Semple and Matson‡ have attempted to determine the effect on the stability of typhoid vaccine of certain modifications in the method of preparation. They injected rabbits and guinea pigs in series, determining the opsonic indices and testing the blood of these animals for its content in agglutinins. In addition the animals were injected with living virulent typhoid bacilli to further ascertain their resistance to infection.

While the injection of rabbits and the subsequent estimation of the antibodies in their blood is of value in deciding the difference in strength between two vaccines, such tests can be expected to detect only gross variations—differences so great as of 25 per cent. or even 50 per cent. This, however, is of much assistance for it enables us to demonstrate the difference between a vaccine almost inert and one of considerable activity.

If we wish to determine the effect of a certain condition upon an antigenic substance we may exaggerate or repeat the exposure many times—far beyond that to which the vaccine would be subjected under ordinary circumstances—and if after this procedure we find no great difference between the treated vaccine and the control we have evidence that may be relied upon.

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*From the Mulford Biological Laboratories, Glenolden, Pa.

†Sci. Mem. by Officers of the Med. & San. Depts. of the Gov. of India, N. S. No. 21, 1906, pp. 1–15.

‡*Lancet*, August 14, 1909, Vol. II, pp. 436–444.

Last winter we were asked many times whether or not freezing would affect the strength of a bacterial vaccine. The number of these inquiries received made it appear that an effort to get exact information upon this point would be worth while.

At the start it was necessary to confine ourselves to certain definite limits. For the preparation of the vaccine a single strain of the typhoid bacillus was used. This organism was selected because it produces antibodies which may be estimated with very little trouble. Likewise only the production of agglutinins was followed chiefly because the technique of the estimation is least complicated and subject to error. The test animals have been rabbits.

TABLE I.

Vaccine Held in Refrigerator.			Vaccine Frozen and Thawed.		
No. of Rabbit.	Titer before treat.	Titer after treat.	No. of Rabbit.	Titer before treat.	Titer after treat.
261	1–20	1–400	263	1–20	1–400.
323	0	1–3200	378	1–20	1–800.
208	1–10	1–800	213	1–20	1–800.
360	1–10	1–800	253	0	1–800.
402	1–20	1–400	420	1–30	1–800.
393	1–30	1–1600	426	1–20	1–400.
23	0	1–800	252	1–50	1–400.

The freshly prepared typhoid vaccine was distributed into sterile 1 cc. glass tubes with rubber stoppers. Half the lot was then put into an ordinary refrigerator, the temperature of which ranges from about 5 degrees C. to 7 degrees C., the other half was repeatedly frozen and thawed. After being frozen the tubes were placed in a cold storage room and kept congealed for twenty-four hours; then they were thawed and were allowed to remain fluid for twenty-four hours; the next day they were frozen again, and so on. This procedure was repeated until they had been frozen and thawed ten times.

Before the first injection the blood of the rabbits selected for the injections was tested for normal agglutinins for the typhoid bacillus. Seven rabbits received vaccine that had been held in the refrigerator, and seven received that which had been alternately frozen and thawed. Three doses were given each rabbit, the amounts and intervals being identical with those generally used for the immunization of man—that is to say, three doses at ten-day intervals, the doses being 500 million, 1,000 million, and 1,000 million, respectively. Ten days after the last injection the rabbits were bled and the agglutinin titer of their serum with regard to the typhoid bacillus ascertained. The conditions under which the serum from both sets of rabbits was tested were identical. The same suspension of typhoid bacilli was used and readings were made at the same time. The results are given in the table on page 176:—

As was to be expected individual rabbits showed wide variations. In the series treated with vaccine kept at about a uniform temperature two rabbits had a much higher titer than any of the others—even than those of the same series. These two bring the average of the "refrigerator" series to nearly twice that of the "frozen vaccine" series.

While the small number of rabbits used does not by any means make the result conclusive, the suggestion is clear that if freezing affects vaccine at all the weakening is slight. Under the ordinary conditions of the market a vaccine would be frozen only once or twice and thus the deterioration in strength would be negligible.

THE EFFECT OF MIXED TYPHOID VACCINE WITH REGARD TO THE FORMATION OF AGGLUTININS.*

A. Parker Hitchens, M. D., and George Hansen, Glenolden, Pa.

Read before the Laboratory Section, American Public Health Association, Washington, D. C., September 1912.

Although the existence of infection with paratyphoid bacilli simulating true typhoid was well recognized when vaccination against typhoid fever was commenced, it is only lately that its importance has been realized. The idea that paratyphoid fever is a very rare condition and that it usually runs a mild course is probably responsible for the fact that we have known so little about its prevalence until recently. The desire to ascertain the true nature of those cases diagnosed as typhoid fever which develop in spite of prophylactic vaccination is partly responsible for the increased attention that has been given to paratyphoid infections.

In November, 1911, Lyons† in reporting an epidemic of paratyphoid A infection in New Orleans, first suggested the use of a mixed vaccine—that is, one containing not only the typhoid bacillus, but the two paratyphoids as well.

Before adopting such a suggestion it should be ascertained experimentally, as far as possible, whether or not there is an objection to the use of a vaccine containing all three bacilli. May it not be possible that the injection of other organisms with the typhoid bacilli will somewhat impair the power of the cells locally, so that the maximum amount of antibodies for each individual type of bacteria injected, will be less than the maximum amount obtainable if one type were injected alone?

To get some idea as to whether or not objections to the mixed vaccine might be based upon such ideas we decided to inject single and mixed vaccines into rabbits and afterward to titrate their serum to learn the relative quantities of agglutinins formed thereby. The animals were divided into seven series, each series receiving three doses of vaccine according to Table No. I.

Injections were given ten days apart; the rabbits were bled ten days after the last injection; the tests were made under identical conditions, the macroscopic method being used. Some of the rabbits showed a slight amount of agglutinins normally for the typhoid bacillus and a few for the paratyphoid B—none agglutinated paratyphoid A in a dilution of even one to two. In the final tests the lowest dilutions used were 1–20.

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*From the Mulford Biological Laboratories, Glenolden, Pa.

†New Orleans Medical and Surgical Journal, November, 1911, pp. 343–350.

TABLE NO. I.

No.	Vaccine Contained.	First Dose.	Second Dose.	Third Dose.
1	Typhoid............	500 million	1,000 million	1,000 million
2	Para. A.............	250 “	500 “	500 “
3	Para. B.............	250 “	500 “	500 “
4	Typhoid............ Para. A.............	500 “ 250 “	1,000 “ 500 “	1,000 “ 500 “
5	Typhoid............ Para. B.............	500 “ 250 “	1,000 “ 500 “	1,000 “ 500 “
6	Para. A............. Para. B.............	250 “ 250 “	500 “ 500 “	500 “ 500 “
7	Typhoid............ Para. A............. Para. B.............	500 “ 250 “ 250 “	1,000 “ 500 “ 500 “	1,000 “ 500 “ 500 “

TABLE NO. II.

No. of Rabbit.	Vaccine Injected.	Agg. Titer before Treat.			Agg. Titer after Treat.		
		T.	A.	B.	T.	A.	B.
534	T........	1/2	0	1/2	1/640	0	0
540	T........	1/4	0	0	1/320	0	0
547	A........	1/4	0	0	1/ 80	1/640	0
533	A........	0	0	0	1/ 80	1/320	0
535	B........	1/4	0	0	0	0	1/320
551	B........	1/2	0	0	0	1/ 20	1/160
542	B........	1/2	0	1/2	0	1/ 20	1/320
546	T.A......	1/4	0	0	1/ 80	1/160	0
532	T.A......	1/8	0	0	1/160	1/160	0
549	T.A......	0	0	0	1/320	1/320	0
541	T.B......	1/2	0	0	1/320	1/ 20	1/ 40
538	T.B......	1/16	0	0	1/640	1/ 20	1/ 40
550	T.B......	1/2	0	0	1/640	0	1/ 80
545	A.B......	1/4	0	1/2	1/ 80	1/640	1/160
544	A.B......	1/4	0	1/4	1/ 80	1/320	1/160
537	A.B......	1/8	0	1/2	1/160	1/160	1/320
543	T.A.B....	1/4	0	0	1/640	1/320	1/ 80

T. = Typhoid; A. = Paratyphoid = A; B. = Paratyphoid = B.

These results would indicate that vaccination with a mixture containing the ordinary number of typhoid bacilli and half the quantity of the paratyphoids would confer as much immunity to each individual germ as though the single vaccine were used.

BOOK REVIEWS.

Food in Health and Disease *By Nathan S. Davis, Jr. A.M. M.D., Professor of the Principle and Practice of Medicine in Northwestern University Medical School; Physician to St. Luke's Hospital, Mercy Hospital and Wesley Hospital, Chicago; Member of the American Medical Association, American Climatological Society, etc.* Second Edition. Thoroughly revised and rewritten, containing much new material. Octavo. XII+449 Pages. Cloth, $3.50.

This is a second edition of Doctor Davis' book, and makes a volume which should be useful to both physicians and nurses. As its title states, it is divided into two parts. In the first one, the fundamental principles of what one should eat, and what one does eat are carefully discussed. No article of food is too insignificant to avoid description, and it is possible to find out in this book, the caloric as well as the physiological value of each. It also gives a historical, biological, and botanical description of each. In this book, it is possible to find out the average diet of all the ordinary groups of human beings as divided by occupation, race, or latitude. For instance, one can compare the diet of a Massachusetts mill worker with that of a farm laborer in Prussia.

The second part of Doctor Davis' book is given up to what might be called the therapeutic administration of food in disease, and his ideas about the exact diet which should be prescribed are detailed for each disease. He discusses thoroughly ninety different diseases, and the suggestions which he makes are useful to one who wishes to carefully select a proper menu for his patient.

The book in its entirety is one which is well written, interesting to read, and useful to own for reference.

Hilbert F. Day, M.D.

Proceedings of the 32nd Annual Convention of the American Water Works Association, Held at Louisville, Kentucky, June 3–7, 1912. *Published by the Association,* 471 *pages with illustrations and insert maps and diagrams.*

The annual proceedings of the American Water Works Association is assuming more and more the dignity of a year book of best American water-works practice. The present volume of papers presented at the annual meeting is an excellent illustration. The extensive discussions constitute an important feature.

An illustrated article by Edward Wegman on Ancient and Modern Water Works is of historical as well as contemporary interest. For comparison with the works of ancient and modern Rome the works of New York City are described quite fully. A paper by William W. Brush supports the contention that the floor area represents a better basis for estimating water consumption than the population. It is more readily obtained and includes large areas occupied for business purposes which would not otherwise be enumerated. It is especially useful in consideration of reasonable consumption in limited districts and determining the size of tap that should be granted for new buildings.

Mr. H. G. H. Tarr, in Fifty Years' Reminiscences, refers to the organization of the American Association. Mr. I. M. DeVarona describes the organization of the Bureau of Water Supply of New York City, with interesting statistics of the water supply. A short paper on the Principles of Efficiency Applied to Water Works by Harrington Emerson follows. A paper by Alexander Potter on the Value of a Continuous Settling Basin and a Discussion of the Economic Principles of Design is sufficiently well described by its title. The discussion is based upon the Muskogee Basin, Oklahoma. The paper elicited considerable discussion.

W. O. Beyer contributes a short article

on Turbine Driven Centrifugal Pumps, with detailed comparisons of the work of such pumps with reciprocating pumps. Additional information of value was brought out in the discussion. F. M. Griswold writes on Progress in Adoption of the National Standard Hose Company and Hydrant Fittings, and W. L. Worrell describes the laying of a ten-inch water main under two streams at Rome, Georgia.

The subject of electrolysis, an ever recurring one among waterworks engineers, is treated at some length and in great detail of both theory and experience, by Albert F, Ganz. The necessary procedure for an electrolysis survey and remedial measures are described.

Doctor D. D. Jackson writes on Chlorination of the Water Supply at Cleveland, Ohio. The interesting suggestion is made that plans are under way to determine the suitability of liquid chlorine as a substitute for the hypochlorite solution. It is estimated that the cost of treatment will range from 25c to 40c per million gallons. The present hypochlorite plant is described together with some interesting comparative experiments on hypochlorite and liquid chlorine gas. The subject of hypochlorite is further treated by S. Y. High who describes the plant at Kansas City, Mo., and the discussion testifies to the general interest in hypochlorite treatment and contributes much interesting information of results at other plants.

Edward S. Cole writes on the Cost of Leaks and Methods for Detecting Them. Another contribution to the same subject is made by F. H. Shaw. The relation of sewage disposal to the water-works problems is indicated by the presence in this volume of an article by Charles G. Wigley, entitled, To What Degree Must Sewage be Purified. A. Maclean describes the water works of Edmonton, Alberta; Henry L. Lyon treats of ice troubles at Buffalo; S. T. Powell on the Endo Medium for B. coli and L. Van Gilder on a forty-eight inch wood stave force main at Atlantic City. Mr. George W. Alvord opened a discussion of depreciation and bookkeeping methods.

The volume closes with a question box in which numerous practical questions are submitted and answered.

Earle B. Phelps,
Massachusetts Institute of Technology.

PUBLIC HEALTH NOTES.

Jails Versus Schools.

A recent issue of *Public Health*, the bulletin of the Michigan State Department of Health, contains a striking example of the ridiculous limitations often placed on public health work. The board recently condemned the Ingham County jail because some of the cells were below the ground-level and were not in sanitary condition. The county was compelled to build a new jail that was sanitary. In District 6, Lansing Township, Ingham County, there is a schoolhouse which has a basement room lighted and ventilated by five small windows. In this room were crowded fifty-five small children. The conditions as to light and ventilation were as bad in the school room as in the jail cell. Yet the State Board of Health has no power to order the school board to provide sanitary schoolrooms, nor, apparently, has any other body. These facts are shown on the front page of the bulletin in an impressive cartoon bearing the suggestive question, "If the state can protect criminals, why can't it protect school children?" Why, indeed? asks *The Journal of the American Medical Association.* It is gratifying to know that the local school board is doing everything in its power to improve the situation. But the fact remains that under the present law in Michigan, all plans for jails are subject to the approval of the State Board of Health, while schoolhouses may be built and are built without any sanitary supervision whatever. Similar conditions are all too common in other states.

Tuberculosis and Housing in Paris.

Paris health authorities have recently made an interesting report which demonstrates both the excellence of their system of records and the close relation between unsanitary houses and tuberculosis.

The health bureau of Paris has had in force now for four years a system of records by which a complete history of every one of the 80,653 houses in the city is kept, showing the sanitary equipment of the house, the number of deaths and cases of sickness in each house, the disposition of each case, and other data by which the true sanitary character of the house or neighborhood may be determined. On data compiled from these and other records, the bureau announces that the 101,496 deaths from tuberculosis during the last ten years, all occurred in 38,477 houses.

A further careful examination of the records of these 38,477 houses clearly establishes the fact that in Paris tuberculosis is localized, that it is concentrated in certain quarters, always the same, and outside of which its ravages do not exceed those of any other disease.

Railway Sanitation.

The sanitary condition of railway beds and the physical welfare of railroad employees are briefly discussed in the December *Medical Review of Reviews.* It has recently been held that it is constitutional for Congress to legislate concerning the physical and sanitary conditions of interstate transportation, and a prominent railroad official, coinciding with this view, advocated a physical examination, by Government inspectors, of railroad employees. "Of the accidents reported by the railways to the Interstate Commerce Commission, sixty-five per cent. to seventy per cent. are stated to have occurred through carelessness of the operators and this is in many cases due to physical defects or to ill-health." The writer believes that these examinations should be made at the beginning of employment and at regular intervals thereafter, and that although the railroads now require periodical medical examinations, without action by the national government no uniformly high standard can be maintained.

The unsanitary conditions of railroad beds has been the subject of much complaint, and a recent order of the Federal Public Health Service, directed to its commissioned medical officers, is quoted as follows:

Such officers "when traveling under official orders on trains and vessels engaged in interstate traffic, are to make such observations as may be practicable of the sanitary conditions of the trains and vessels on which they travel and the stations and wharves at which they stop. The results of these observations will be noted in a report to be submitted to the Bureau upon completion of the travel authorized. This order does not authorize officers to conduct formal inspections or to give instruction or offer advice to employees of common carriers. The making of the observations mentioned is desired solely for the information of the Bureau and for the compilation of facts relative to the sanitary conditions prevailing in interstate traffic."

The Care of Milk in the Home.

"1. Take in milk and cream as soon as possible after being left at your door and place in refrigerator.

"2. Keep milk and cream cold until ready for use.

"3. If ice cannot be had, wrap the bottle in a wet cloth and stand it in an open dish of water by an open window, out of the sun. Evaporation of the water will cool the milk.

"4. Keep milk and cream covered until wanted, and in the bottle in which it is delivered. In open bowls or pitchers it will absorb odors from food and collect flies and dust.

"5. Pour from the bottle only what milk or cream is needed for immediate use.

"6. Milk or cream that has become warm should never be poured back into the bottle of cold cream or milk.

"7. Utensils used for milk should first be rinsed with cold water, then washed with warm water and soap or washing powder, and finally rinsed with boiling water, thoroughly drained and allowed to become cold before being filled with milk.

"8. Have a separate bottle of milk for the baby.

"9. Wash and return all milk and cream bottles daily.

"10. No person ailing or sick with contagious disease, or one having the care of such person, should have anything to do with the care of milk or of milk utensils."

Circular No. 1. *Massachusetts State Board of Agriculture.*

Germs in Finger-Bowl.

"The United States public health service is out with a denunciation of the finger-bowl. Dr. C. H. Lavinder says that as a means of spreading infection and contagion the finger-bowl is in the same class with the common drinking cup and the roller towel.

"Dr. Lavinder asserts that in many supposedly high class restaurants there are in use only about a half-dozen finger-bowls and these do service for many patrons."

Boston Record, January 8, 1913.

Registering the Baby.

"This country has been much too slow in recognizing the great importance of an adequate registration of births. In only a few states is registration even fairly complete; in many states the laws are defective or poorly enforced; in a third of the states there is no law at all. In Europe, on the other hand, especially in those countries that have a conscript army, the registration of births is enforced with completeness and precision as a military measure.

"The Children's Bureau, recently established by the national government, will try to perfect a system of registering births, and get it adopted throughout the country.

"The attempt deserves general and hearty support, for this is a matter that deeply concerns every home in which a child is born. A birth certificate or certified copy of a birth registration record, may become vital to prove or disprove the right of inheritance, to enter school, to testify in court, to claim insurance money or a pension, to buy or sell real estate, to make contracts, to marry, to vote, to enter the army or the navy, to get and pursue employment, to hold office, to establish citizenship. Indeed, as the country grows older, transcripts of birth certificates must be more and more relied upon as the only admissible evidence of identity in all legal matters.

"Moreover, there is the highly important matter of the public health. Preventive medicines and preventive measures depend for their efficacy upon the promptness with which they are applied, and in being always applied. One third of the youthful blindness in the United States results from 'baby's sore eyes,' a disease that shows itself in from one to ten days after birth. Every person blind from this cause is needlessly blind, for the disease is easily prevented; but the authorities must know in time.

"In localities where, by means of visiting nurses, an organized effort is made to reduce the infant death rate, success depends on quick and complete registration of births. Nearly one fourth of the babies that die within their first year live less than a week, yet in most states, even in so old a community as New England, thirty days is the period within which the birth of a child may be legally registered. That is too long; in a matter so important, no chances should be taken."

The Youth's Companion, January 9, 1913.

Typhoid in Cleveland.

The November (1912) *Cleveland Medical Journal* contains an article by D. D. Jackson on the Cleveland Water Supply. Mr. Jackson considers the typhoid problem at some length and gives an interesting tabulation of the various sources of typhoid in that city. The percentage for which the water is responsible varies, in Mr. Jackson's estimation from zero to 15 per cent. for different years.

The analysis is as follows:—

"1. General Sanitation (transmission by flies, etc.)	30%
"2. Water Supply	10%
"3. Milk, Oysters and Raw Vegetables	5%
"4. Contracted out of town	10%
"5. Contact cases	45%

Housing the Russell Sage Foundation.

Roscoe C. Edlund, of the Sage Foundation, describes for the *Survey*, (December 7, 1912) the new building now being erected for this organization. Although five years ago, when the work of the Foundation was begun, two small offices were sufficient, at the present time the various departments occupy five sets of offices in three different buildings, in New York City. This fact alone emphasizes the necessity for new quarters, under one roof, so that the various branches of the organization may be brought into closer touch with each other's activities, in a building specially designed for their work.

The new building, on the corner of Lexington Avenue and East 22d Street, is to be nine stories high, with sufficiently strong substructure to permit the addition of three stories more. The main floor will contain a lecture hall with 100 seats and a large exhibition hall. The offices and workrooms will occupy the second to seventh floors, inclusive, while on the eighth and ninth floors will be the library, lunch room and rest rooms for women.

Mr. Edlund in the same article summarizes the departments of the Foundation as follows:

"The Child Helping Department, which is endeavoring to improve conditions surrounding dependent, neglected, and delinquent children; the Department of Child Hygiene, whose aim is to promote public health, recreation and education, especially of children; the Charity Organization Department, whose aim is to promote the better organization of charities; the Division of Remedial Loans, which is conducting a campaign against loan sharks and encouraging the organization of remedial loan societies; the Investigation of Women's Work, which is gathering facts regarding the conditions of work of women in New York; and the newly organized Department of Surveys and Exhibits which will be a clearing house for advice and information on social surveys and exhibits."

A National Department of Health.

"If a father comes home from business to find one of his children seriously ill, he does not treat the matter as he would a business question. That child's illness is a bigger and more important matter to him than any mere question of dollars and cents. There is only one thing that he regards as of more consequence than the health of the members of his family, and that is their character and reputation. When illness enters his household, he needs no further argument to persuade him that human life is more valuable than property.

"And yet if Americans were judged by the Government they have made for themselves, they would appear to place a higher value upon property than upon human life. The Federal Government is very well equipped on the whole, to help farmers protect the health and lives of cattle; but it is very badly equipped to enable the American people to defend their own health and their own lives."

Thus the *Outlook* for December 7, 1912, introduces an editorial on "Health and the Federal Government." The editorial quoted further discusses the necessity for a single, unified, administrative body devoted solely to matters of health, and finally describes the two chief functions of such a department, when established, to be: First, publicity, the acquiring and distributing of information on public health matters. Second, protection, regulation, and the enforcement of laws dealing with the health of the people.

In the same number of the *Outlook* is a comprehensive discussion of "The Problem of National Health" by Dr. Earl Mayo.

"False Food Standards and the High Cost of Living."

Under this title the *Journal of the American Medical Association* for December 7, 1912, argues with great sanity for the use of certain types of food stuffs now either ignored or repudiated by the average American when marketing. The writer points out the necessity for recognizing the economic causes underlying the high cost of living and wisely remarks that "legislative enactments can accomplish no permanent gain where they are based on false principles."

One of the food items most interestingly discussed is meat. There is, of course, a great deal of preference on the part of most people for certain "cuts" of meat, and in the mind of the average buyer the more expensive portions are supposed to contain a greater amount of nutriment. However, as the nutritive value depends upon the content of protein and fat, and as the cheaper "cuts" are not notably deficient in these substances, compared with the more expensive ones, "the cheaper cuts of beef are by far the most economical sources of both lean and total edible meat, including fat and lean. . . . It is high time that those purchasers to whom matters of justifiable economy make an appeal should be educated to appreciate the irrational standards that characterize the demand for beef, to realize that the low priced cuts are by far the most economical sources of nutriment from flesh and accordingly to profit by the prevailing discrepancies in market prices."

Cold Air.

"There is a certain amount of stimulation in cold fresh air that warm air does not possess. The cold acts as a tonic to the whole system, stimulating the action of the heart, increasing the appetite, and aids generally the performance of all the bodily functions. It is accepted almost universally that the greatest gain in health by consumptives is made in cold weather; and ex-patients frequently report that they lose in the summer and gain in the winter."

After thus lauding the value of cold fresh air the November number of the *Journal of the Massachusetts State Sanatoria* gives some very practical directions as to the ventilation of rooms in winter, the wearing of sufficient, though not excessively heavy clothes, etc.

Regarding ventilation it is stated that "it is a common mistake to think that a window open and the room cold means fresh air, it does not at all. Pure air in a room can be had only by allowing the air that has been used to escape, and fresh air to take its place, no matter what the temperature may be." Stale cold air is worse than stale warm air, for it compels the body to resist both cold and bad air, instead of bad air alone.

Midwives and Infant Mortality.

New Jersey was one of the thirteen states mentioned by Doctor Jacobi in an address before the American Medical Association that had laws regulating midwives, but no school for their instruction. This defect has now been remedied in that state, and the organization, aim and methods of the new school, are described by Dr. Siegfried Husserl in the *Journal of the New Jersey Medical Society* for December, 1912.

For a large proportion of the tenement population in the large cities the midwife takes the place of the physician and the confidential advisor. She is as frequently called in for professional advice as for practical service, and it is in the capacity of advisor that she can be of greatest use, if properly instructed, in the prevention of infant mortality. Doctor Husserl discusses the importance of providing the midwives knowledge concerning the necessity of breast-feeding and the principles of artificial feeding. "If Doctor Jacobi is right in stating that breast-feeding will save 100,000 babies that now die or become invalids from no other cause but unnatural feeding, then there is no doubt that a great deal can be done toward that goal by carrying this gospel to the tenement districts in an organized way, through the modern midwife or practical nurse."

The law providing for a school of midwifery in New Jersey sets forth thirteen subjects in which training is demanded. The most important of these are:

1. Physiology of menstruation.
2. Female pelvic anatomy.
3. Management of normal labor.
4. Management of the puerperium.
5. Sepsis and antisepsis in relation to labor.
6. Cause and effects of ophthalmia neonatorum.

Vacuum Bottles and Infant Feeding.

"It has come to the knowledge of the State Board of Health that the so-called vacuum bottles, designed to maintain liquids at a desired temperature, either hot or cold, for several hours, are being used to keep the baby's milk *warm* for feeding through the night or on a journey, or for other convenient periods.

"The result of keeping *warm* milk in such bottles for several hours is the development of bacteria in immense numbers consequently rendering the milk dangerous for infants.

"There is no medium better suited for the rapid growth of bacteria than warm milk, and for this reason many municipalities have established regulations requiring milk to be cooled immediately after being drawn from the cow and to be delivered to the customer at a temperature not exceeding 50° or 55° F.

"A low temperature is necessary to inhibit the growth of germ life, to prevent early souring, decomposition and other detrimental changes. It will, therefore, be seen that the keeping of warm milk for several hours in one of the receptacles referred to, is the exact reverse of reasonable sanitary precautions to preserve milk in a safe and palatable condition.

"The changes that take place in milk at a comparatively high temperature are such that when fed to infants frequently result in digestive disturbances, diarrhœa and other pathological conditions, often terminating fatally.

"The manufacturers of at least one of the so-called vacuum bottles, recognizing this danger, call attention in their descriptive literature to the fact that *warm* milk should not be kept in such a receptacle, unless it has been previously Pasteurized or sterilized; and they further state: 'Keep the milk *cold* in one bottle, and hot water in the other. At feeding time, mix the milk and hot water in proper proportions, which will not only heat the milk, but will dilute it to the required strength,' the procedure to be only in accordance with the advice of the physician."

Bulletin of the State Board of Health of New Hampshire. (October.)

The Seven Ages of Milk.

Dr. Charles Cristadoro, of Point Loma, Cal., in an article on "Certified or Clarified Pasteurized Milk," in the December *Dietetic and Hygienic Gazette*, describes the sanitary history of milk production in the following popularly impressive way:—

"1. Neglect age.—Meaning anything and everything unsanitary; filthy stables and as filthy cows; dust, flies, unclean cans and pails and unclean milkers perhaps, using unclean milking methods, and careless cooling and storing of the milk.

"2. Water age.—When 25 per cent. to 50 per cent. of water was added to the milk to make it hold out.

"3. Skim age.—When all or part of the cream was skimmed and kept at the farm, and the milk sent to town.

"4. Preservative age.—When salicylic and boracic acid were used, and then formaldehyde to keep the milk chemically sweet.

"5. Tuberculosis age.—When milk was found to be, through the bovine bacillus, a transmitter of the white plague.

"6. Pasteurization age.—When all 'uncertain' milk was made safe through application of heat, 145 degrees Fahrenheit for 30 minutes, correctly, honestly and thoroughly done.

"7. Golden age.—When all milk shall be 'certified' in the full and sanitary sense and meaning of the term as to environment and methods, machine clarification to take place immediately after the milking, when the milk is fresh from the cow and before germ multiplication has commenced, either from the foreign matter or from the slimes already present in the milk; then cooling and bottling at the farm, pasteurization after bottling, to make assurance doubly sure."

Playgrounds in Buffalo.

That the Buffalo Playground Commission is inspired in its work by a most admirable spirit is indicated by an article on this subject in *The American City* for December. It is evident that the Commission's work is based on a conception of the fundamental meaning of the word recreation—genuine re-creation. The playgrounds, numbering thirteen, and costing $500,000 have an average daily attendance of 5,309, and are under the care of a director, an assistant director, and a caretaker for each playground. Each center is fully equipped with ice rinks, toboggan slides, teeter ladders, etc., and arrangements are made for games and folk dances, gymnastics, tramping and swimming parties, sewing classes, gardening, and many other forms of entertainment and instruction.

One highly commendable innovation is the provision for evening use, the grounds being turned over to working boys and girls, men and women, after 5.30 p. m. One of the playgrounds has been equipped with large electric lights and in the evening from 500 to 600 boys and girls and many grown-ups employed during the day, assemble for games and exercises. The report of the Commission indicates its broad social attitude as well as its appreciation of the still inadequate means at their disposal. It says, in part:—

"When this department is forced to use unsuitable quarters, when we have to accept the hospitality of various settlement houses for winter work, and when we have to rent one gymnasium, all at a time when a modern new school building equipped with gymnasium, swimming pool, showers and assembly hall, is closed down half of the time and the facilities afforded not used at other times, we believe that something is wrong, that the municipality needs greater coördination of the various departments. The Commission is greatly in favor of the movement toward increased use of the school buildings for recreation purposes, and by recreation purposes we mean everything which tends to the improvement of the mental, moral and physical well-being of the people."

Safety in the Streets.

The children's branch of the National Highways Protective Society has adopted the following rules, calculated to promote safety on public streets:

"1. All members must agree to use the nearest playground.

"2. No member shall play ball or any game where a missile is thrown in the streets.

"3. All members shall refrain from hitching on to vehicles, moving or stationary.

"4. No member shall jump on or off moving street cars or other vehicles.

"5. No member shall jump at, throw stones, or stand in front of automobiles, wagons and trolley cars.

"6. All members shall cross the streets only by crosswalks.

"7. All members shall endeavor to aid, as far as lies in their power, the maintenance of clean streets.

"8. No member shall throw paper or refuse of any description in the streets, or build bonfires, or upset ash or garbage cans."

The American City, December, 1912.

Dust-proof Ash Collection.

The interest the press is taking in sanitary matters is indicated by the following editorial from the *New York Sun*, December 21, 1912;

"The Commissioner of Health announces that all wagons used for hauling loose loads must in future be covered, and after January 1 no licenses will be given for wagons which are not properly equipped with tarpaulins.

"This is a highly desirable reform, considering the intolerable nuisance of flying dust. As the public ashcarts are among the very worst offenders it is reassuring to learn that Doctor Lederle 'hopes to induce the Street Cleaning Department to conform to the new ordinance.' All we hope is that some effort will be made to enforce the new rule. Some months since the use of cut-out devices in motor-cars was restricted by an ordinance, but only in theory, for after the first few weeks little or no attention was paid to it and now it is quite common to hear cars bellowing up the principal thoroughfares with perfect impunity."

Infant Mortality and the Schools.

"It cannot be repeated too often that the most fundamental cause of infant and child mortality, expressed through many channels, is ignorance and the most potent influence which will destroy and remove it is imparted and applied knowledge."

Such is the view of Henry Coit as expressed in the *Public Health Journal* of Toronto for December, 1912. Mr. Coit describes the work of the Babies' Hospital of Newark, especially its efforts to utilize the public schools in fighting infant mortality. He believes that there are two main channels of approach. In the first place, instruction should be given to girls and young women, as part of the regular courses, in infant and child hygiene and the care and management of children. This work should be begun with the "Little Mothers" of the eighth grade and should be carried out in high schools, finishing schools for girls, and women's colleges.

The second method pointed out by Mr. Coit in which the school buildings and equipment should be used, is the more general instruction of mothers of the industrial class in the congested school and tenement districts. Many of these mothers did not and most of them could not complete the curriculum of the school. This plan, as already carried out to a great degree in Newark, involves instruction "in hygiene, reasons for cleanliness, dangers of dirt, care of the newborn, importance of breast feeding, the care of milk, artificial feeding, weaning, children's diet, management, advantage of system, the bath, the clothing, the room, the air, ventilation, and sunshine, the baby's bed, its sleep, danger of anodynes, exercise and the care of the sick child." Surely, such knowledge, imparted through these channels, should be most effective in preventing infant mortality.

Typhoid and Surface—Privies.

In the Journal of the *American Medical Association* for January 4, 1913, Charles T. Nesbitt, M. D., Superintendent of Health, Wilmington, N. C., describes the methods used to control a typhoid fever epidemic in that city during the summer of 1911. As to the epidemiology of the disease he states that, "the typhoid problem in Wilmington as elsewhere is occasioned by the exposure of infected feces to flies, and by the pollution of the soil and water. In rural districts, towns and small cities where the use of the sewer is limited or does not exist, it is obvious that the first attempt at typhoid control must be directed toward the sanitary disposal of human excreta, more especially that of typhoid patients."

In June, 1911, the disease was spreading rapidly, and in view of the fact that there are in Wilmington more than 5,000 surface-privies, the plan adopted for the control of the epidemic is of interest:

"Each sanitary closet-can, when removed for cleaning, was thoroughly scrubbed and disinfected, and before being replaced in a closet was filled to one-third of its capacity with a disinfecting solution of known typhoid bactericidal efficiency. In addition a circular letter was addressed to every physician in the city requesting him to notify the health office as soon as the symptoms in any suspected patient suggested typhoid, and to use every means in his power to secure the screening of the patient and the disinfection of all excreta. The health office agreed immediately on notification to coöperate with the physician in his efforts to render the case innocuous. To prevent any typhoid excreta from going through the sewers into the Cape Fear River the health office was to supply every household in which there was a case of typhoid with a steel can in which the excreta from the patient might be kept and disinfected. . . . As soon as a suspected case of typhoid fever is reported a galvanized steel can of 12½ gallons' capacity, containing three gallons of disinfecting solution and supplied with a tight lid, is sent to the house of the patient. An extra quantity of disinfectant is supplied for the disinfection of bed linen and clothing. Another can is provided, if desired, for use in disinfecting these articles. The can containing the disinfected excreta, is placed in an out-building, kept tightly closed at all times, and is removed, cleaned and redisinfected as often as is necessary, without cost to the citizens. New cans are furnished for every exchange in order to prevent the possibility of offense which might be occasioned by the use of a previously used can."

The results obtained are indicative of the success of the method, for during the five summer months of 1912 there were reported only 59 cases, as against 250 cases for the same period in 1911.

Vital Statistics in New York City.

"Referring to our recent comment on the need of accounting for the lives of this city, a correspondent says: 'What we really need is a State Statistician, with an adequate staff, devoting his entire time to vital statistics.' That may be important for the rest of the State, but it would not help this city. Its problems are different from State problems, and, very properly, the City Department of Health is not subordinate to the State Department.

"In this city, but not in the State, the preliminary work of counting deaths, births, and marriages is nearly done. But having the facts, there is no one to tell the public what they mean. For this interpretative work the committee of the Academy of Medicine suggests an appropriation of $40,000 a year.

"Of course, until their meaning is disclosed, the mere gathering of the facts is worth nothing. The leaders in the campaign for the public health could very effectively stir public sentiment, and in the right directions, when armed with the proper analyses and interpretations. The United States has competent statisticians for insurance companies, for railways, finance, taxation, and so on, but the number of vital statisticians in the public service could be counted on the fingers of one hand. England, France, and Germany have far outstripped us in this care for the public health. That is why, for one thing, the average life in Prussia has been lengthened more than in the United States, and more lives there are prolonged through the years of greatest efficiency."

Editorial in *New York Times*, December 18, 1912.

Impugning a Successor.

An editorial in the *New York Tribune* for December 24, 1912, is indicative of the rational attitude which many papers have taken on the subject of Doctor Alsberg, the new food chemist.

The editorial is in part, as follows:—

"Why not give Dr. Alsberg a chance? He has been in office only a few days and there is a chorus busy saying that he won't do. Dr. Wiley led this chorus by intimating doubts of his successor's administrative ability. Since no possible good could come of saying this, Dr. Wiley might better have refrained from saying it. His words about the administration of the pure food law carry so much weight that he should be careful in their use. The last thing which we can imagine to be his wish is to cripple his successor at the outset of his career by depriving him of public confidence. That could only aid the food adulterators.

"Another of the new chief chemist's sins is a recent interview given by him to *The New York Times.* The language lacks 'punch.' Therefore we shall all soon be consuming food reeking with poisonous drugs. The 'therefore' is not so obvious as it should be. Dr. Alsberg has not, it is true, his predecessor's gift of striking utterance, but no one doubts his scientific attainments, and his honesty of purpose has not been successfully impugned. His courage, though of a quieter sort, may fully equal that of his brilliant predecessor. And if we ever do turn and rend him let us rend him not because he is not another Dr. Wiley, with the redoubtable ex-chemist's extraordinary personality, but because he weakly or corruptly lowers Dr. Wiley's standards of food purity."

The House-Fly and Bacteria.

In response to the general demand for more definite knowledge on this subject, Doctors Cox, Lewis and Glynn, working in the Thompson-Yates Laboratories in Liverpool, have made a very thorough comparative study of "the number and varieties of bacteria carried by the common house-fly in sanitary and unsanitary city areas." Their study is reported in the October number of the *Journal of Hygiene.* Descriptions of the areas investigated are given, together with the methods of catching the flies, of estimating the number of bacteria carried, etc. It is possible here to indicate only the most important conclusions reached in the summary of the work.

1. Over 450 naturally infected flies (*musca domestica*) were examined, and it was found that the amount of pollution of a liquid resulting from the flies' vomitus or excrement or from their wallowing in the liquid varied from 2000 bacteria in 5 minutes, to 350,000 in 30 minutes.

2. Flies from sanitary areas carried from 21,000 to 800,000 bacteria while from the congested, unsanitary districts the numbers were from 800,000 to 500,000,000 per fly.

3. The number of intestinal organisms on flies from the two types of districts held the same relationship, sanitary areas showing 100–10,000, unsanitary areas 10,000–333,000,000 per fly.

4. Pathogenic bacteria and those allied to the food poisoning groups were isolated from flies from the unsanitary areas, never from the sanitary areas.

5. Other organisms isolated were streptococci, staphylococci, sarcinæ, B. pyocyaneus, B. coli, etc.

6. Flies caught in milk stores were more highly contaminated than those from other food establishments.

7. If food is abundant flies migrate only very short distances, so that the number and degree of contamination often may be taken as criteria of the sanitation of the area.

8. Organisms identical to Morgan's infantile diarrhœa group were isolated. In districts where infantile diarrhœa is rare flies carry fewer bacteria than in sections where the intestinal disturbance is common.

9. "As the amount of dirt carried by flies in any particular locality, measured in terms of bacteria, bears a definite relation to the habits of the people and the state of the streets, it demonstrates the necessity of efficient municipal and domestic cleanliness, if the food of the inhabitants is to escape pollution, not only with harmless but also with occasional pathogenic bacteria."

Tuberculosis in Vermont.

A special state commission of Vermont appointed by Act of legislature in 1910 to consider the need for more hospitals for advanced cases, has recently reported that there are 1500 living cases of tuberculosis in that state of which 400 are in an advanced stage of the disease. Part of the report of the commission follows:

"The commission beg leave to report that they have sought information from every town in the state and find that there are practically fifteen hundred cases, four hundred of which are advanced cases of tuberculosis all the time in the state. In this advanced stage these persons are a serious menace not only to those around them, but to the community. Many of them are without any home of their own, as well as devoid of other pecuniary resources. Hence they are in many instances obliged to seek shelter among the inmates of the poor house, or in some family to whom the Poor Officer gives a small stipend.

"Segregation is a logical measure for the prevention of tuberculosis. The patients most needing segregation are the advanced ones, as they are most contagious and the least able to exercise precautions.

"We most earnestly recommend the construction of a sanatorium for this class of tuberculosis people and herewith submit plans for the same and are informed by a reliable architect that one can be constructed according to plans given for $25,000.00. These plans are similar to the one recently built in Providence, Rhode Island. Having inspected this building, we are of the opinion that it is the most satisfactory of any which we know about.

"We further recommend that the Governor continue a commission to decide upon a location and the construction of such a sanatorium."

The members of the commission were Dr. Henry D. Holton, Secretary, State Board of Health, Samuel E. Darling and Alanson C. Bailey.

Social Insurance and the Doctor's Future.

"Abraham Jacobi, trustee of the New York Academy of Medicine, a physician who can look back on a long life of activity in progressive movements in medicine and out, warmly congratulated the academy at its recent anniversary meeting on having fallen in line behind the economist and the reformer. Indeed, the drift of the papers at this session on the 'doctor's future' was nothing less than an advocacy of making medicine a part of statecraft and the doctor a public servant of infinitely more importance to the commonwealth than the politician in Congress. Ideas travel fast, and both speakers of the evening, Charles L. Dana and Algernon L. Bristow, laid down as a pattern suggestive for America the system of social insurance which has recently gone into effect in England.

"Dr. Dana saw in the future a general practitioner whose work should be largely prophylactic. Working in coöperation with him, he saw a body of specialists very much larger and better equipped than we have today, who should get their training through a perfected hospital system in use by practically all the sick. He noted that already the tendency toward institutional care in sickness is well under way; and he noted also that such care, or care by the nurse in the home, is beginning to supplant cure by drugs, and that a decrease in the number of physicians is being accompanied by better training of those who graduate from the medical schools.

"The physician of the future, Dr. Dana believed, in his prophylactic function, should have the care of more than merely the living individual. He should be the great eugenist, the Æsculapius who would appear side by side with Venus in every true and realistic love story, to protect the race yet unborn. The prophylaxis of the physician-statesman of the future, would be still broader; he would be the public sanitarian. The food and drug supply would come under his supervision, and he would supervise conditions both of labor and of recreation.

"Dr. Bristow discussed that development of the medicine of the near future which both he and Dr. Dana considered the most important—social insurance for those whose very poverty makes the family physician an impossible luxury, and who today have to fall back upon the medical benefit society for such half care as it gives in time of illness. In the single state of New York he showed that two races alone, the Jews and the

Italians, have three hundred thousand members in sick benefit societies. The only alternative that the future offered to people thus circumstanced was, he believed, to depend on the overworked, ill-paid, inefficient lodge doctor, or to provide mutually for themselves through social insurance.

"For the physician himself he believed that social insurance held no menace, but, rather, a promise of a surer means of earning a livelihood."

The Survey, December 14, 1912.

Vaccination Reduces Army Typhoid.

The War Department has just issued some statistics in support of the effectiveness of the new typhoid fever inoculation. It is stated that there have been only 12 cases of typhoid fever and only two deaths, among the 57,000 troops of the United States during the past ten months. Most of the cases, it was asserted, were among recruits who had not received the treatment. Both of the deaths—one of an officer, the other of a recruit—occurred among the men who had not been inoculated. The records of the army in regard to this disease are claimed to be unsurpassed, and advocates of the theory of inoculation as a safeguard against typhoid look upon it as justification of their position.

In view of the fact that some of the troops are in the field serving under conditions which in previous years would have resulted in typhoid at the rate of 150 cases and 15 deaths in a corresponding period, army doctors feel that there is no question of the wisdom of this inoculation. The rates of typhoid per thousand, beginning with 1906, is as follows: 1906, 5.66; 1907, 3.55; 1908, 2.94; 1909, 3.03; 1910, 2.32; 1911, .80, and 1912, .18. With a view of use of the treatment in the state militia, it is announced that the anti-typhoid serum can be procured from the Medical department, United States army, at an approximate cost of 12½ cents for each complete inoculation of three doses, and may be obtained either as a charge against the allotment of the state under section 1661, Revised Statutes, or as a purchase for cash from the state funds, under the provisions of section 17 of the Militia law.

Social Legislation.

The Survey for December 7, 1912, reviews the work of the Sixty-second Congress from the standpoint of the passage of legislation of a social character, and indicates the most notable results in the following manner:—

"The Phossy Jaw Act, prohibiting the use of white phosphorus in the manufacture of matches.

"The eight-hour law and the eight-hour provisions in the postal, fortifications, and naval appropriation bills—not new legislation, but an extension of old.

"The provision in the postal appropriation bill allowing federal employees to petition Congress and join what organization they please.

"Extension of the Federal Workmen's Compensation Act.

"Amendment to the postal appropriation bill, giving to publications of labor and fraternal organizations the same postal privileges as are given to other publications.

"Establishment of the Children's Bureau.

"Establishment of the Commission on Industrial Relations."

Infant Mortality and the Employment of Mothers.

This is the subject of volume thirteen of the U. S. Government reports on Woman and Child Wage-Earners in the United States, recently issued. The introduction to the report lays emphasis on three main points. First, in 1900 the infant mortality rate (deaths under 1 year per 1,000 births) was 159.3 as contrasted with a death rate of only 14.1 per 1,000 population over one year. In other words, the infant rate was eleven times the rate for all other ages of childhood and adult life. Second, while there has been a persistent decline in the general death rate during the last few decades, the infant mortality rate has persistently remained about where it was before the period of improved sanitation. "Indeed, in many places it appears that they die in greater numbers and more readily than in the past." Third, the factors in the problem fall into two groups, the first including general sanitary conditions, urban, rural, domestic and municipal, housing, etc., and the second, social conditions, involving ignorance, economic welfare, the employment of women, illegitimacy, and similar problems. The report may be obtained from the Commissioner of Labor, in Washington.

Mental Hygiene.

That a great step forward is about to be taken in the means and methods employed in the control of mental defectives is indicated by the outlines of a plan given by Doctor Barker, as reviewed in the *New York Times* for November 10. Doctor Barker, as president of the National Committee for Mental Hygiene, announces that an unnamed philanthropist is willing to give $50,000 for this cause, provided another $200,000 is raised. Doctor Barker is quoted in part as follows:

"If the doctrines of modern medicine are true, the general problems of mental hygiene become obvious; broadly conceived, they consist, first, in providing for the birth of children endowed with good brains, denying, as far as possible, the privilege of parenthood to the manifestly unfit, who are almost certain to transmit bad nervous systems to their off-springs, that is to say the problem of eugenics; and second in supplying all individuals, from the moment of fusion of the parent germ cells onward, and, whether ancestrally well-begun or not, with the environment best suited for the welfare of their mentality."

The immediate instruments to be utilized in the proposed campaign are, first, advanced research and investigation for prevention and cure of the various forms of insanity; and second, an educational, publicity campaign, the spreading of all knowledge already ascertained among the people by means of exhibits, literature, press accounts, etc. The latter is of special importance, for progress depends on the overcoming of the ignorance, apathy, and prejudice so characteristic of the public mind in its attitude toward this most vital problem.

The Commission on Industrial Relations.

On December 17, 1912, President Taft sent to the Senate the following nominations for the recently authorized Industrial Commission:

George Sutherland, attorney-at-law, George B. Chandler, member of the Connecticut Legislature, Charles S. Barrett, President of Farmers' National Union, Frederick A. Delano, Adolph Lewisohn, Ferd C. Schwedtman, Austin B. Garretson, John B. Lennon, James O'Connell.

Immediately after the appointment a meeting of the committee which had promoted the legislation was called, and issued the following statement, as reported in the *Survey* for December 28, 1912:—

"The appointments by the President to the Commission on Industrial Relations, just announced, are a great disappointment to the large body of economists and social workers who presented to the President and to Congress the need for a searching inquiry into the causes of unrest and the relations of labor and capital. Such an inquiry would be of great value to the nation if conducted by a group of persons well known for their special training and experience in relation to the problems which have grown out of recent industrial changes and the widespread disaffection of labor, who would work together and present in an authoritative way to public opinion the reasons for much needed remedial legislation. Some of the nominees are men of ability and distinction in public affairs, but the commission as a whole fails especially in the following particulars:

"1. No woman has been named a member of the commission, although there are now more than 6,000,000 women wage earners in the nation.

"2. There is no well-known economist or social worker, to speak for the increasingly effective work that is being done by our universities and colleges, civic and social organizations and the more authoritative element of the public press, in the analysis of the forces of industrial democracy.

"3. While the three representatives of employers in certain notable particulars are representatives of the interests of employers, and the representatives of labor were officially recommended by the Executive Council of the American Federation of Labor and the Railway Brotherhoods, it will be generally recognized that the commission lacks men of such public prominence in this special field of inquiry as to give assurance that the enlightened public interest, which is the chief interest at stake in this most important task, will be adequately represented.

"President Taft himself, in his message to Congress recomending the creation of this commission, said, 'The time is ripe for a searching inquiry into the subject of industrial relations which shall be official, authoritative, balanced and well-rounded.' Whatever the excellence of the individual members, the commission as a whole, if confirmed by the Senate, will not in the eyes of the public meet this high hope."

This statement was signed by such representative men as John B. Andrews, J. W. Jenks, Paul U. Kellogg, S. M. Lindsay, Stephen S. Wise, Edward T. Devine, and others of equal prominence. The *Survey* concludes that "it is the hope of the committee, that either the president will reconsider his nominations, or that the Senate will fail to confirm them."

School Hygiene.

"One hundred and twenty-five thousand school children of Buffalo and vicinity will sign a mammoth invitation, to be sent to the heads of nearly fifty nations, requesting them, for the sake of their little cousins in those lands, to send as many delegates as possible to the fourth International Congress of School Hygiene, which meets here in August. In addition, the invitation will be signed by Dr. Charles W. Eliot, President Emeritus of Harvard, who is President of the Congress; Mayor Louis P. Fuhrmann and other prominent men.

"Among the nations to which the invitation will be sent are England, France, Germany, Russia, Italy, Spain, Finland, Rumania, Servia, Greece, Portugal, Holland, Sweden, Denmark, China, Japan, Korea, India, Canada, Brazil, Argentina, Chile, and Ecuador.

"Formal invitation for the congress will be issued through the State Department in Washington. President-elect Woodrow Wilson will be asked to make the opening speech."

New York Times, December 25, 1912.

The Discontinuance of the Free Administration of Diphtheria Antitoxin by the Department of Health of the City of New York.

The free administration of antitoxin in diphtheria, and the performance of intubation, by the inspectors of the Department of Health of the City of New York, was begun in 1895, the objects in view being not only the cure and prevention of the spread of the disease, but also the education of the medical profession and the general public. These ends have been accomplished. The death rate of the disease in Manhattan and The Bronx has fallen from 15.9 per 10,000 of population in 1894 to 2.2 in 1912. In 1894 twenty-nine out of every one hundred cases reported, died. In 1912 less than nine cases out of every hundred died, Since 1895 almost 40,000 cases have been injected with antitoxin furnished by the Department of Health, and of these, less than 6 per cent. proved fatal. Finally, the records show that at the present day practically every case of diphtheria receives antitoxin.

On and after February 1, 1913, therefore, the present system of free administration by inspectors of the Department of Health, of diphtheria antitoxin and performance of intubation at the homes of the patients, at the request of attending physicians, will be discontinued. After that date, when it becomes necessary for the Department of Health to administer antitoxin or perform intubation in any case of diphtheria, the patient will be at once removed to one of the hospitals of the Department for further observation and treatment. Diphtheria antitoxin may still be obtained, free of charge, by physicians from supply stations at drug stores for use where payment for the same by the patient would be a hardship.

Compulsory Sanitation.

"The government of the United States has made it plain to the government of Ecuador that it must clean up the pest-hole of Guayaquil, and that it must do so in accordance with plans approved by Colonel Gorgas of the United States army medical corps, who, with a staff of experts, has already gone there to study the situation.

"Readers will ask what right this government has to interfere thus arbitrarily with the domestic affairs of another nation, and what power it has to compel Ecuador to submit.

"The right springs from the duty that the United States owes to the rest of the world. Guayaquil is the nearest South American port from which foreign ships will clear for the Panama Canal, and is a port of call for much of the shipping of the southern Pacific. The city, which has eighty thousand inhabitants, is built on the low banks of the broad estuary of the Guayas River. All about it is stagnant water that breeds mosquitoes. It has no sewer system and no adequate water-supply. Yellow fever and typhoid are always prevalent there, and bubonic plague appears at frequent intervals. When Mr. Root, then our Secretary of State, made his tour of South America, he refused to visit Guayaquil because of the danger to the health of his party, and, for the same reason, Mr. Bryce, the British ambassador, on his recent trip along the west coast of South America, would not land there.

"When the Panama Canal is opened, ships from different parts of the world will call at Guayaquil, and in addition to their cargoes, will take on plague-infested rats and the germs of yellow fever and typhoid, and carry them through the canal to the rest of the world. The probability that the canal will increase the business of Guayaquil, and therefore the risk of spreading its diseases, has made the cleaning up of the place imperative.

"The power of the United States to compel Ecuador to submit grows out of its right to control the shipping that passes through the canal. If Ecuador permits Guayaquil to remain a pest-hole, we can close the canal to all ships that call there. The result of that course would be that foreign vessels would avoid the city, in which case even its present small trade would die.

"The army medical corps has banished yellow fever from Cuba and from the Canal Zone of the isthmus, and has freed Manila from plague, cholera, and other Oriental diseases. It is quite as capable of cleaning up the port of Guayaquil."

The Youth's Companion, January 16, 1913.

An Important Decision.

A recent decision by the Supreme Court of Ohio with reference to the responsibilities of counties under the tuberculosis law of 1909 is of a peculiar significance to anti-tuberculosis workers, both because of the points covered and also because of the unusual language used by the court rendering its decision.

By the Act of 1909 and as amended in the year following, any county in Ohio may erect a tuberculosis hospital by vote of its county commissioners, or any five counties may combine to erect a joint or district hospital in the same manner. The case which has just been decided by the court, arose over the withdrawal of Stark County from an agreement with four other counties to erect a hospital for Akron because the cost of construction as originally estimated was found to have been increased. The case was carried through the Circuit Court and finally into the Supreme Court. In both courts the judges held that Stark County, after once agreeing to enter into a combination to build a district hospital had no right, legally or otherwise, to withdraw from this combination and that it must maintain its share of the joint burden of the erection and maintenance of the district hospital. Commenting on this matter, the Supreme Court's decision reads:

"When the joint board provided for in that section (3148 G. C.) has been duly formed in accordance therewith, and has thereafter proceeded with the performance of the duties imposed on it by the statute, each of the counties whose commissioners have joined in the formation of such joint board, has obligations in connection with the matter, which are fixed and defined by the statute and which cannot be terminated at the will of such county.

"The act of the legislature, which provides for establishing and maintaining a district hospital for the care and treatment of persons suffering from tuberculosis, is a valid exercise of legislative power, not repugnant to the constitution."

In regard to the necessity and advisability of such legislation Judge Johnson, who wrote the opinion says: "This law was passed in response to an intelligent public sentiment which was formed in the light of gratifying advances in medical science in recent years. The legislature in the enactment of the law exercised the police power which belongs to it on the depositary of the sovereignty of the state, and in the performance of its duty to provide for the health, safety and best interest of the people. It was an effort on the part of the legislature to provide a plan for arresting the advance, and, if possible, for the extermination of a dreadful disease."

Further particulars concerning this case may be secured from Mr. James E. Bauman, assistant secretary of the Ohio State Board of Health, Columbus, Ohio, to whom the JOURNAL is indebted for the information contained in this note.

An Interesting Presentation.

As a mark of their appreciation of the courtesies shown them by the officials of the New York City Health Department on the occasion of their recent visit to this country, Professors Gärtner of Jena, and Weber of Berlin, have presented the Department of Health with a bust of Robert Koch. A bas-relief of Koch was also presented as a personal gift to Dr. Charles Bolduan, assistant to the General Medical Officer.

Mental Hygiene in Preventive Medicine.

Under this title the *New York Medical Journal* for December 28, 1912, discusses the work of the different organizations interested in the prevention of insanity and mental defectiveness. It points out that while immigration is one of the causes of the alarming increase in mental unsoundness in this country, it is not the only factor. The editorial discusses the work of the National Commitee for Mental Hygiene and states that the aim of that organization is "to conserve mental health in every possible way; to promote the study of mental disorders and to popularize the knowledge of their causes, treatment, and prevention; and to promote the organization in each State of a society for mental hygiene, similar to the one now existing in Connecticut. The National Committee for Mental Hygiene, in short, aims 'to become a clearing house for the nation on the subject of mental health, the prevention of nervous and mental disorders, the care and treatment of the insane; and aims also to become a coördinating agency for all State and local agencies interested in these problem.' "

In conclusion, the editorial points out the obligations which from this standpoint, rest upon the physicians of the country:—

"Physicians have been slow to realize that the prevention of insanity and mental defectiveness, not only in relation to the individual patient, but more particularly from the eugenic standpoint of the survival and improvement of the race, is one of the most significant and valuable fields of modern preventive medicine. But there is a rapid awakening to this new conception, and the pioneer work of these committees for mental hygiene deserves active support and intelligent coöperation."

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HEALTH WORK PROGRESS IN AMERICA.

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Health Commissioner, Buffalo, N. Y.

Read before the American Public Health Association, Washington, D.C., September, 1912.

It was not so very long ago that a well-organized department of health in this country was an exception. Today, the contrary is true. Great progress has marked public health work in the United States. Every state in the Union within the last few years has been making great strides forward, so that in no city of any size in our progressive states, in no village or town is it an impossibility to find a health officer whose work is not only to keep track of the birth and death records, but also to look after the contagious and infectious diseases, sanitation of the homes, and very often, the examination of children in the schools. Unfortunately, the Federal government itself has not as yet undertaken the work, which every citizen, every physician who is wide awake and every public health worker is strongly hoping for, viz., a central office with a bureau or department where all knowledge pertaining to public health should be collected and all information sent broadcast.

Even the registration of births, deaths and marriages in this country is not as it should be and the registration area is far from covering the entire Union. This is at present one of the great needs of our economic system, in not being able to have the collection of proper data and registration of vital statistics, of contagious and infectious diseases, and so on, in the Census Bureau. Where, therefore, is this great progress?

In the first place, as before stated, in the organization of municipal health departments which not only bears fruit in the various cities of which they are part and parcel but they wield great influence in the surrounding country where health officials are influenced by the example of the cities in their neighborhood and look to them for inspiration and good work, in matters pertaining to public health.

How many cities in America two decades ago, had bacteriological laboratories for the purpose of examining milk, water and food? Now every city of importance maintains such laboratories for the purpose of detecting bad milk, bad water, for the examination of sputum and cultures taken from the throats of children, the examination of blood for typhoid fever, of smears for gonococcus, the investigation for diphtheria and typhoid carriers, and the entire range of subjects which are the necessary armamentarium of a modern health department in fighting disease and death.

The examination of plans for the installation of sewers and plumbing in our cities; the inspection of such work done—is a development only of recent years and it marks a very important progress in health work in America.

How many of us for a moment would give up the control of our public and private markets, groceries, bakeries and confectioneries, ice cream and soft drink manufactories; how many public health workers do not believe that this progress made in recent years in the milk production, not only in the cities but on the dairy farms is a most prominent milestone in the progress of public health work; the supply of antitoxin, whether it is against diphtheria infection or tetanus, of the possibility of the development of rabies; the vaccination not only against smallpox but other diseases and especially valuable in recent trials against typhoid. All these spell *forward and progress* in health work in this country. Isolation in infectious diseases; a thorough study of the same—whether it is pellagra or hookworm or Bubonic plague or anterior poliomyelitis—all work of the greatest importance to the community and all work that must in time show great reduction in morbidity and mortality.

For instance, let us consider the last mentioned disease, anterior poliomyelitis. Buffalo has been visited by quite an epidemic, if you might call it such, very recently. Two hundred and fifty cases would not be really considered an epidemic in a large city, if the disease had been measles, whooping cough or chickenpox but anterior poliomyelitis, a disease of which we know very little and which must be fought in ambush and which strikes terror to the hearts of mothers when as high as 60 per cent. of the children affected are liable to become permanent cripples—see what great progress has been made in the study of that disease.

It was only a very short time ago when it was said that it was better to be a hog in America than a child; that the government would send an expert to prevent lump jaw in cattle; to eradicate disease among swine, to stamp out the boll weevil among the trees and plants, where they would be willing to spend hundreds of thousands of dollars on any of these cases mentioned but would pay very little attention if an epidemic were to break out among children or adults.

We had conservation commissions for the preservation of the forests, for the preservation of rivers and interior waterways, commissions to protect fish and game because they have a monetary value to the community, but human life was considered to be so cheap that hardly any attention was being paid to it; but now it is different, and the government at last is devoting some time and more money to the study of maladies of its greatest asset, viz.: the men, women and children.

When anterior poliomyelitis broke out in Buffalo and it was beginning to reach the hundred mark, the government was appealed to to tell us what they knew about this dreaded disease, and what was found in the latest investigations, regarding the etiology, symptomatology or treatment. The government sent men who had spent considerable time in the study of this disease in various parts of the country, first one and then another. The Rockefeller Institute for Medical Research of New York City, asked us whether we would permit a research worker to be sent to our city so that he might study the conditions of the disease here and, perhaps, be able to help in the elucidation of certain phases; the State Department of Health and the city itself did not fail to grasp the situation and for a considerable time and even at the present time, no less than twelve men are attacking this disease from all sides, studying it, experimenting, making a complete survey of the dreaded malady against helpless children.

This is progress; for all of you know, that not a very great many years ago there was neither an institution of medical research nor could the government or state make so thorough an investigation or study of such a situation, having no men or means at their command. Here we see great progress; progress not only in finding the cause of the disease; progress not only in the treatment but also very important, progress in informing the public of the prevention of the malady. To isolate a child suffering from diphtheria or measles or even whooping cough a decade ago, in many communities, and to place the house in quarantine, was considered almost an impossibility, as it would violate public sentiment. Now, no health officer fears attacks from that side but goes ahead, quarantines, isolates and uses various immunizing sera and vaccines in order to rid the community of any danger and save it from extension. Isolation or contagious disease hospitals are being built, not only by cities and counties in various states, but private purses are being opened all over the country in order to give the best possible attention to those who may suffer from a contagious disease. It is true that many hospitals have been erected, but it is also true that, comparatively speaking, few people suffering from tuberculosis, for instance, can be sent to sanatoria on account of lack of sufficient accommodations,—but the communities are aware of the dangers, and progress is being made, remedying the crying needs. What community was there not so many years ago that would think of sending nurses into private homes to look after the sick not only from a non-communicable disease but to any without exception?

We are rapidly stamping out many epidemics by means of sera and vaccines and biological, chemical, and chemo-therapeutic agents—the plague, the dysentery, typhoid fever, and cholera; we are preventing the spread of venereal diseases by various agents, including not only drugs but publicity and sex education. We have noticed considerable movement in various parts of the country that our rivers and lakes from which we draw our potable water supply ought to be prevented from pollution, and organizations are actually being formed which prevent the pollution of our waterways. This is *progress.* Until we stop making open sewers of our rivers, lakes and streams, we cannot hope to reduce the too great morbidity and mortality due to the gastro-intestinal disorders; we cannot hope to reduce the death rate from typhoid fever. Not only are we stopping the pollution of our waters but we have taken steps by chemical, by biological and by physical agents to purify our sewage—and all this is but the progress of recent years.

Take the great battles which are being waged against the fly, the mosquito and the rodents; the war against tuberculosis on which millions and millions of dollars are being spent, not only in the hospitals and sanatoria, not only in the segregation of those who are suffering from this disease, but in taking most active steps in preventing the development of the disease, by building hospitals not only for chronic but also for incipient cases, by maintaining day and night camps, sending literature into the homes, placarding the fences with instructions and using all means whereby knowledge may be disseminated for the prevention and the cure of the disease.

Health work to be efficient and to be progressive should have a number of co-partners. First of all comes the public press, acknowledged not only as a disseminator of news, but chiefly as an educator and moulder of public opinion. The press of America is the peer of any in the world and while there may be differences of opinion as to the manner of obtaining certain results, yet all strive to accomplish the greatest good. Among the other co-partners are the departments of education, public safety, police, poor, railroads, the numerous clubs, philanthropies and granges, and above all, the great public; the final tribunal. Public health workers in America are frank to acknowledge their indebtedness to all these.

There are many directions whereby this country can make great progress in public health work. It has made a great step forward when medical and dental school inspection was instituted, when publicity of health work was advanced in the press and by platform lectures before associations and gatherings; when persons afflicted with mental diseases were properly treated in psychopathic wards and literature disseminated to prevent insanity. How much more can be done?

Let me for a moment note the fact that we have a most thorough inspection of the milk supply, of our meat supply, of food adulterations, but in how many communities in this country have we properly protected not only the inhabitants, but the stranger and traveler from infection by preventing the drinking of contaminated water from pumps and wells? You ask the average farmer or average person what he thinks about the water in the well on his premises and he will invariably tell you that the water is pure, clear and sparkling and yet, how many of these wells may not be contaminated with pathogenic germs? The inspection of many other things is no reason why a most thorough inspection should not be made of the wells, lakes, rivers and streams—that all water supply not only in the cities but in the farming districts should be guarded. The state or county should order a most thorough control, and a periodical examination should be made and an official notice posted at all sources of water supply, stating the condition of the water, whether it is pure or otherwise, whether it is liable to bring about a disturbance of the gastro-intestinal tract or not.

Much has been done in public health work in this country but considerable more is yet in view. This is but a résumé, short and free from detail and yet, perhaps, may throw considerable light on the work which is being done to prevent the various communities from disease and many unnecessary deaths.

HOW SHALL WE SPEND THE HEALTH APPROPRIATION?

CHARLES V. CHAPIN,
Superintendent of Health, Providence, R. I.

Read before the Massachusetts Association of Boards of Health, January 30, 1913.

It must be admitted that we cannot spend it as we would like. All human endeavor is hampered by tradition. Much of the work of health officers is done because it has been done before. Most sanitary procedure dates back a very long time and is based upon notions or theories developed when science and scientific health officers were even more rare than at present. If one were given a fixed amount each year for sanitary purposes, to be expended as he deemed most effective, untrammeled by precedent, it is not likely that a single city could be found to furnish a budget one would care to take for a model. No health department has as yet been organized on a scientific basis. Its powers and duties are given to it hap-hazard, sometimes from terror at an epidemic, sometimes at the insistance of a trade which hopes for benefit, sometimes because a councilman through exuberant enthusiasm, or for personal reasons, pushes a pet project, and sometimes, and this with increasing frequency, because some band of earnest reformers with more energy than wisdom, hopes to abolish some sanitary evil by plans of its own. More rarely it happens that a well conceived plan of the health officer is crystallized in an ordinance and vivified by an appropriation.

The merchant or the manufacturer if he hopes to succeed against competitors, must by good accounting learn which goods yield the highest profit. So the health officer, if he wishes his department to have its due share of the municipal budget, must learn which line of work yields the most for the sum expended. He should seek for greater financial assistance for the most effective work and should eliminate, cut down, or at least not emphasize, those functions which yield little return for the money. It is difficult to change the directions of sanitary endeavor but certainly it is our duty at frequent intervals to take account of stock and try thereby to discover the most profitable lines. It is also our duty to clearly set forth our conclusions even though it may not be easy to convert the public, and particularly town and city councils, to new view points.

One notion of which we must disabuse ourselves is that human life is priceless. There is, I know, a species of cant which loves this phrase and we are told that any expenditure is warranted which will save life. But people do not really consider life priceless. During the last decade I suppose that several thousand lives have been lost in automobile accidents, but most of us are willing to take the risk and no one suggests the abolition of automobiling, which alone would stop the accidents, though legislation is called for which would reduce them to a minimum. If the cost of saving life by official sanitary action is too great, that line of effort had better be abandoned even if lives are lost. A few deaths occur each year from trichiniasis. These could doubtless be prevented by a microscopic examination of each slaughtered hog. The cost however would be enormous, and it would not be worth while. A hundredth part of the sum if devoted to baby nurses would save a thousand times as many lives. There never will be a large enough health appropriation to do everything that will save life so let us try and spend it so that it will save the most lives.

In considering public health work we must take into account not only its cost to the municipality but also its cost to the citizens directly. We must estimate not only what it costs the health department to abate nuisances, to inspect plumbing, to improve the milk supply, to teach mothers how to save their babies; we must also consider how much these improvements cost the property owner, the builder, the consumer of milk and the mother. It is as unwise and unjust to throw a heavy financial burden on the citizen as it is to place it upon the city.

Lastly we must consider cost in connection with certainty of result. A man might be entirely justified in investing his savings in a cotton mill when he should hesitate to buy mining stocks or start an air-ship factory. We know that vaccination prevents smallpox, antitoxin cures diphtheria, the purification of water reduces typhoid fever, anti-mosquito measures exterminate yellow fever and malaria, and rat-proofing stops plague, but do we know that the isolation of advanced tuberculosis checks the disease, or that the inspection of milk farms limits epidemics, or that an anti-fly campaign reduces typhoid fever, or that meat inspection lessens disease, or the cremation of garbage lowers the death rate. I am not saying that these latter procedures may not be useful but that they do not justify expenditures as do those first named.

Much of the work of health officials may have very little direct influence on the public health but yet may be of great importance, and indeed may be looked on as a necessity for public comfort and convenience. In our financial statements we should segregate as far as possible the expenses of this kind of work. The Federal Census Bureau in its comparative statistics of cities has thus attempted to separate expenses which directly affect health as of medical inspection, laboratories, hospitals, school inspection, prevention of infant mortality and the like from those which indirectly affect it, as charges for the removal of ashes and garbage, the prevention of ordinary nuisances, smoke prevention, plumbing inspection and public comfort stations.

Many of these expenditures for the public comfort we would not wish to see cut down but we should object to have them considered as truly health expenses even though in many cities they are placed in the health department.

One of the debatable public health functions is that of sanitary inspection. There is no doubt that the sanitary inspection which banishes excrement is worth what it costs. There is no doubt too that the general cleanliness of premises conduces to personal cleanliness. In certain cities inspection directed against rats or mosquitoes is of fundamental importance. Some claim that great attention should be given the fly but they have not proved their point. In the average city of the north, the tendency is to make too much of sanitary surveys and the abatement of nuisances, much of which had better be left to the police. A few years ago most cities spent far more for nuisance inspectors than for medical inspectors and nurses and there are not a few which do so at the present time.

The inspection of plumbing, while desirable, has in many places been carried to an extreme, entailing needless expense on the builder. It is not properly a public health function.

So too, scavenging, the removal and disposal of garbage, ashes, refuse, night soil and dead animals, should not be considered primarily health work, though it is necessary enough, and ought to be done well, and sometimes the health department proves more efficient for its accomplishment than does any other. In New England most of the garbage is fed to swine. This usually causes some nuisance but ought not to cause much. I have never learned that it is a menace to health. Yet there is a constant pressure on our cities to adopt a more "sanitary" method of disposal by cremation or rendering. This usually entails a heavy additional expense. If the new method *is* sanitary and there is plenty of money, well and good, but if children still die from lack of antitoxin, or cannot get good milk, or perish from lack of doctors' or nurses' care, is it not better to feed the pigs a little longer?

For the present at least the control of the infectious diseases seems to be the most important and one of the most effective departments of public health work. Efficient medical inspection in typhoid fever, summer diarrhea, scarlet fever and diphtheria certainly prevents the extension of these diseases within and without the family. This is most apparent in the history of such work in small communities. Perfunctory inspection and advice amounts to little and is therefore wasteful. Efficient inspection will cost little more and will yield results well worth the cost. The value of visiting nurses in the infectious diseases we know little about but the outlook is promising. Let us go slowly and *record our results* lest we become extravagant.

Antitoxin saves many lives. It might save many more. To get the best results it is necessary to administer antitoxin as well as to give it away. In this way it is given earlier and in better quantities. In New York in 1909 of 566 cases treated with antitoxin by private practitioners 69 or 12.2 per cent died while of 1749 treated by the health department doctors 58 or 3.3 per cent died, a saving of 151 lives. The cost of the service was $18,000 or $130 per life saved. Similar results from free treatment are obtained in Providence where it has cost about $100 for each life saved.

Vaccination against smallpox ought to be one of the most economical of sanitary procedures. If every one could be thus immunized, as in Germany, the disease could be eradicated. It might cost $2,000 or $3,000 a year to keep 100,000 people immunized, a cheap insurance. General vaccination during an outbreak is less rational and less effective, but much cheaper and much more effective than isolation, indeed the latter alone is usually, in an established outbreak, not effective at all. Vaccination against typhoid fever and perhaps against some other diseases is also at times cheap and effective.

Quite at the other end of the scale of usefulness is terminal disinfection but perhaps it is only necessary to say in this connection, what probably most of you would agree to, that much of the money now spent for this purpose could be used to better advantage in other ways.

Hospitals for contagious diseases are expensive. When scarlet fever hospitals were urged in England thirty years ago it was believed that they would cause the eradication of the disease. Instead there is really no convincing evidence that they have at all lessened its incidence. Nevertheless, paradoxical as it may seem, there is evidence that removal to the hospital does prevent the spread of disease in the family. In Providence it appears that removal to the hospital cuts down secondary cases one third. If this were the only result of hospitalization it would not be worth the cost but most hospital cases cannot receive proper medical care and nursing at home and many lives are saved by removal to the hospital, particularly in diphtheria and measles. It is easy to extend hospitalization too far and many cases which are ready to go to the hospital, to save home trouble and expense, could be just as safely, and more economically, cared for at home.

The campaign against typhoid fever is very profitable. It has been shown that the cost of protecting the water supply is amply repaid by the prevention of sickness and death. But filtration and the tapping of new sources are usually based on other reasons besides health conservation, so that it is not fair to charge all the expense to sanitation. It has also been demonstrated that the removal of privy vaults markedly diminishes typhoid fever. In Providence I have no doubt that a hundred cases a year were prevented thereby. An actual investigation has shown that a single case of typhoid fever costs at least $125, and as the total expense to the health department of the removal of the vaults, was less than $5,000 it appears that the cost of removal has been paid twice over every year since it was done; and the vaults should have been removed as nuisances even if they had no effect on health. We have of late been told that typhoid fever is propagated by dirty back yards and flies, and Levy in Richmond and Terry in Jacksonville claim to have greatly reduced the prevalence of typhoid fever and other fecal-borne diseases by efforts directed against privies, flies, and general dirtiness. If their claims are correct, well directed sanitary inspection may be another cheap method of fighting typhoid fever. So too district nurses and anti-typhoid vaccination may prove of great assistance, but as we begin to make use of them let us count the cost and tabulate the results as an up-to-date manufacturer would count the cost of a new process.

One of the most attractive fields of sanitary endeavor, from a financial standpoint, is the prevention of infant mortality. It has now been demonstrated beyond a doubt that the chief cause of a high infant death rate is the ignorance of the mothers. It has also been shown that this ignorance can be overcome by visiting nurses, baby consultations and the like. Wherever these are used intelligently the death rate falls. In Providence it appears that about 200 babies a year have been saved in this way. It costs about $6,000 a year to do it, or $30 per baby.

Milk supervision from the chemical standpoint is necessary to protect the pocket of the father as well as the nutrition of the child. It is worth all it costs. There is evidence too that dirty milk causes disease which clean milk would prevent. There is, however, dispute as to the degree and kind of cleanliness, that is freedom from bacteria, most essential. Under the circumstances it is well to go slow as regards both the expenditure of the health appropriation and increasing the cost of milk. Many cities have done much to improve the milk supply, but have done nothing to show the people where to get the good milk so the babies still die because their mothers buy the poorest milk in the city.

The inspection of foods has little relation to the public health though it is a subject which yields many startling news items and lurid editorials. One of the most absurd activities is the fight against "bob" veal. There may be reasons why the raising of calves should be encouraged as there are certainly humane reasons why the railroad traffic in nursing calves should be stopped, but there is no good reason for forbidding the use of immature veal for food. It may at times cause sickness but so do strawberries and lobsters and mince pie.

Certainly the very worst use which can be made of the health appropriation is to employ it for the purpose of paying political debts. Decreased efficiency is the sure result and the community which permits such a misuse of the public funds will deservedly suffer an increasing toll of sickness and death.

I am inclined to believe that the medical supervision of school life is an exceeding profitable line of sanitary endeavor. Nevertheless it must be admitted that few departments keep records in such a way as to show what is really being accomplished and at what cost. In Providence in 1911, taking account only of the more serious conditions such as malnutrition, tuberculosis, deformities, greatly enlarged tonsils, marked adenoid disease, middle ear disease and defective vision, to secure adequate treatment it cost about two dollars for each child. Much other work was done in minor skin diseases, pediculosis and a great number of comparatively unimportant ailments. It is desirable in this school work to give more careful study to methods and costs in relation to results, and if funds are limited, to focus attention on the more important "defects," striving to use properly this word so often abused in this connection.

One of the least costly and most productive lines of work is the keeping of accurate records of sickness, deaths and of expense. When a business concern goes into the hands of a receiver and the accounts are found in hopeless confusion, suspicion falls on the efficiency if not on the honesty of the former manager, and it may fairly be assumed that if he had kept a better oversight through accurate accounting there might not have been a receiver. When your committee on uniform health reports discussed with various members of this association the necessity for full and accurate records and accounts, a very good friend of the writer suggested that such things were of no use to anybody except some statistical crank like old Chapin. Yet I feel very certain that the time will come to most health officers when, in order to answer the pointed questions of some newspaper man, city councilman or social worker, there will be felt sore need for accurate statements of cost and results.

It is difficult to measure the worth of a bacteriological laboratory in terms of sickness prevented, just as it would be that of postage stamps, a telephone or a horse or automobile for an inspector. A bacteriological laboratory, is a tool, essential for the control of infectious diseases, just as a chemical laboratory is necessary for control of the milk supply. We cannot get along without either.

Educational work ought to yield great returns for the money. Lectures, exhibitions, moving pictures, leaflets, bulletins and press articles are all useful. Their relative effectiveness should be studied, just as an up-to-date business man studies advertising. The great problem is what to teach. To teach what is not so is far worse than not to teach at all. How much of what passes as sanitary science is not worth the name. The man who has to get out a weekly health bulletin is certain to print many half truths as well as full fledged errors. It is sad to ask the public tomorrow to forget what they were taught today.

The purpose of this paper is not to offer dogmatic statements as to the value of this or that sanitary procedure but rather to ask questions and offer suggestions, and no attempt has been made to cover the whole field of sanitary endeavor. The paper is primarily interrogatory and I am asking this question "How shall we spend the health appropriation" of myself, fully as earnestly as I am asking it of you. If we will all take up these problems for careful consideration and study I am sure that it will lead to a more effective and economical expenditure of the public funds.

ELEMENTARY THEORY AND PRINCIPLES OF STREET CLEANING

S. Whinery,
95 Liberty Street, New York.

Read before the Sanitary Engineering Section, American Public Health Association, Washington, D. C., September, 1912.

The cleaning of city streets is necessary for several reasons which may be summarized as the preservation of the public health, the physical comfort and convenience of the people, and a regard for decent cleanliness and good appearance.

Of these, the preservation of the public health must be considered of first importance.

Filthy streets have long been held by sanitary authorities to be a prolific cause of disease. But our views as to the exact way in which street filth causes or propagates disease have, in the light of more recent investigations and conclusions, undergone a notable change. The prevailing idea in the past, among sanitarians and physicians as well as in the public mind, has been that filth and organic matter in the process of decay gives off poisonous gases or exhalations capable of conveying if not of creating various diseases in the bodies of those exposed to it. Thus, it was held that the effluvia from sewers entering dwellings through untrapped pipes and fixtures was the direct cause of much sickness.

More recent investigations and the development of the germ theory of diseases led to the conclusion that a large number, if not all of the infectious or contagious diseases that affect mankind are caused, directly or indirectly, by specific organisms which propagate and multiply in the blood, and that these organisms or their germs are carried into the body not by gaseous exhalations, but only by solid or fluid matter with which the germs are incorporated or to which they are attached. We, therefore, hear little now, from those qualified to express an opinion, about the deadly character of sewer gas, and other like emanations.

The smells and effluvia from filth and decaying matter, while they may affect the general health and lower the vitality, and thus make those exposed to them more susceptible to attack, are no longer regarded as in themselves able to create or to convey specific diseases. The organisms that cause these diseases must reach the blood through physical contact or by conveyance in connection with solid or fluid matter introduced into the alimentary or respiratory systems.

These conclusions have an important bearing upon the theory and practice of street cleaning.

From the sanitary point of view street dirt may be divided into two physical classes or forms: first, the comparatively fresh, coarse and recently deposited material, such as animal excrement and the usual refuse matter and rubbish that reaches the streets, and second, the finely comminuted matter, which, when dry, is called street dust.

The first, especially when damp, possesses sufficient ponderability to prevent its being taken up and carried by ordinary currents of the air. It may be repugnant to the sight and smell and the effluvia given off by it, particularly if allowed to remain until it becomes putrescent, may to a certain extent be deleterious to the public health, but under ordinary circumstances it can not be a vehicle to convey disease germs into the human system. The hypothesis that it does not do so is supported by experience. It is quite common, especially abroad, for persons and families to live over or near unclean stables in which domestic animals are constantly kept, or in the immediate vicinity of piles of decaying manure, without any appreciable effect upon the health of those so exposed. It seems to be established by abundant experience that laborers constantly engaged in the handling of fresh and usually moist street sweepings in large masses, enjoy as good health as those of the same classes engaged in other occupations.

Reasoning, therefore, from both theory and experience the conclusion seems warranted that ordinary fresh, coarse and damp street dirt, even when in a condition of partial putrefaction, is not normally a source of serious danger to the public health, even though it be infected with the germs of disease.

In the second form named, that of dust, street dirt is, from the sanitary standpoint, wholly different from the first.

When the coarse material reaching the street is not removed with reasonable promptness it is subjected to the drying effect of the sun and air and to the pulverizing action of travel and is thereby reduced to a condition of powder so fine and light that it readily floats in the air when disturbed, and may be carried by winds or breezes to considerable distances. While thus suspended in the air it may be breathed into the lungs or deposited upon the bodies of those in the vicinity. It may float or be blown into dwellings, to be deposited upon articles of food, culinary utensils or chinaware, and thence be conveyed directly to the alimentary systems of the occupants, or it may settle temporarily upon the furniture, goods and fixtures of dwellings or business houses only to be again disturbed and set in action.

Assuming that this street dust is infected with disease germs, it is obvious that the conditions could not be better for disseminating them and conveying them into susceptible human bodies.

The question whether, and to what extent disease germs exist in street dirt has been quite widely discussed. It has been argued by some that the infrequency of contamination and the comparatively small quantity of infectious material that reaches the streets makes street cleanings almost negligible as a source of disease. Unfortunately, we have very little reliable data on the subject. It is known that cultures from street dirt swarm with bacteria, but the writer is not aware that the bacteria of any specific disease has been definitely found therein.

Considering the known facts, however, one can hardly doubt the existence in street dirt of disease germs to an extent that can not be otherwise than dangerous.

In our American cities particularly, our streets are the common dumping ground of refuse and dirt from many sources. The cleanings from many dwellings and from most business houses are swept into the streets. That such sweepings often contain the germs of diseases emanating from sick rooms or from diseased persons occupying or visiting business houses cannot be doubted. The streets and sidewalks are the common receptacles of expectoration and are so used by many persons affected by mild cases of specific diseases, such as tuberculosis, typhoid fever, diphtheria and other infectious diseases, or just recovering therefrom. It is probable though not proved that the excrement of horses and other domestic animals may carry these germs. It is doubtless true, however, that the quantity of infected material thus reaching the streets is small as compared with the total volume of the street dirt, and it may often be wholly absent from large masses of the collected material; also the fact that infection is likely to result from the street dust only, which is but a small part of the whole, tends to diminish the danger. But in view of all the facts we can not avoid the conclusion that this street dust must often be the vehicle for propagating and spreading zymotic diseases.

If the views here outlined are accepted as true they indicate that important changes should be made in the present practice of street cleaning. Our efforts should be more particularly directed, first, to preventing the formation of street dust, and, second, to the removal by efficient methods and in a manner that will prevent its unnecessary dissemination, of such dust as may be unavoidably formed.

Heretofore in our American cities the principal object has been to remove the coarse dirt at such intervals of time as convenience or necessity might dictate by methods and apparatus not well adapted to removing the dust, which was largely allowed to remain on the street. If the quantity of dust became sufficient to cause discomfort when blown about by the winds the streets were sprinkled with water to lay the dust. This was a palliative only, since but a small part of the dust was washed into the sewers and the remainder was left on the street to be again converted into dust when the intervals between sprinkling were long enough to allow the moisture to evaporate. Until quite recently the streets in all our cities were cleaned almost exclusively with coarse-fiber street brooms or the horsepower sweeping machine, and this practice still prevails on a great part of the streets in most cities and towns. As a means of removing the coarser dirt these methods are reasonably effective and would be quite satisfactory if the sweeping could be done at sufficiently short intervals. But where the streets of heavy travel, and consequently of large accumulations of refuse, are swept but once daily, or at longer intervals, and usually at night, the heat and travel during the day are sure to convert much of the dirt into dust which the coarse-fiber brooms stir up but do not satisfactorily remove.

It is true that the sweeping machines are usually preceded by the sprinkling wagon for the purpose, mainly, of preventing the clouds of dust that would otherwise be raised to the annoyance of those exposed to it, rather than to facilitate the removal of dust from the street. If not enough water is used to just moisten the dust and cause it to adhere and aggregate, most of it will remain on the streets, while if too much water is used the dust is converted into a paste which the brooms plaster upon the street surface to again be converted into dust under the action of the sun and travel.

For the purpose of removing the coarse accumulations, patrol or hand cleaning with broom or scraper, or both, is most efficient and satisfactory. This is true if for no other reason than that the dirt is more promptly and frequently removed. The cleaner passes over his beat several times during the day and thus removes the refuse before it has had much time to dry out and become pulverized.

For the removal of such dust as can not be prevented, the only effective and satisfactory way yet developed is to wash the surface with water. This may be accomplished either by the use of machines of the squeegee type, which scrub the surface, or by flushing with water under pressure to dislodge and carry away the fine material. For the latter, either flushing machines or hose attached to fire hydrants are available.

It is true that these methods if thoroughly used carry the removed dust into the sewers or drains, which is regarded by many as objectionable, and as likely to clog the pipes. This might happen where the whole of the street dirt, coarse and fine, is thus carried together into the sewers, though the writer does not know of any instances where actual trouble has thus resulted. The practice of cleaning the streets wholly by squeegee-ing or flushing is not, however, to be recommended, if for no other reason than that it would be impracticable to do the work several times each day and thus prevent the formation and flying of dust.

The danger of clogging the sewers by flushing the dust only into them is very remote. The quantity of the dust remaining after proper coarse cleaning is small. Careful determinations by the New York Commission on Street Cleaning and Waste Disposal (1907) showed that on smooth pavements cleaned by the patrol system the accumulation of dust in forty-eight hours after the street had been washed either by hard rains or by flushing, does not exceed 5 or 6 per cent. of the total daily quantity of street dirt, though on rough stone-block pavement it may be much larger. This quantity is so small that its disposal through the sewers could hardly cause serious trouble. In fact the large volume of water used tends rather to flush and clean out the sewers.

It may be further objected that such disposal does not destroy the disease germs present in the dust and that the septic impurities in the sewage would thus be increased, but this could not occur to a dangerous extent, even where the sewage is discharged into streams or rivers, where dilution is ample and oxidation rapid.

If the views here outlined are sound, the theory and controlling principles of street cleaning may be summed up as follows:

1st. Street dust is the form in which street dirt is the most dangerous to the public health.

2d. From the sanitary point of view, therefore, the most important function of street cleaning is the prevention of the formation of street dust and the prompt and safe removal of any such dust as may accumulate on the streets.

3d. To prevent the formation of dust the coarse and usually moist excrement and refuse should be collected and removed as effectually and as frequently as practicable, before it becomes dried and pulverized. The most effective and satisfactory way of doing this is the patrol or hand-sweeping method.

4th. For the removal of the dust that will accumulate to some extent, scrubbing or washing the street surface with water is the only practical and effective method yet devised.

The ideal system of street cleaning would, therefore, be efficient patrol or hand cleaning through the day or during a longer period if the volume of travel in the evening requires it, and thorough scrubbing with squeegees, or washing with water under pressure by flushing machines or hose at night, as often as may be necessary.

It may be objected that the funds at the disposal of the street cleaning departments of most cities would not permit the adoption and adequate application of this system in many American cities. To this it may very properly be answered that in matters seriously endangering the public health the question of cost should not be controlling, unless that cost be absolutely prohibitive, or wholly disproportional to the benefits that would result.

Actual experience, however, seems to prove that the method here recommended, that is to say, constant application of patrol or hand cleaning through the day followed by scrubbing or washing with water at night, need not be so expensive as to be discouraging.

The streets of Washington are notable for their cleanliness. The method here recommended has been in use for nearly two years with most satisfactory results both as to effectiveness and cost. In the report of the Street Cleaning Division for 1911 it is stated that in the neighborhood of one million square yards of street surface were cleaned every day except Sundays and holidays by the patrol system. The hand cleaning was supplemented by washing the surfaces about one and one-half times each week. The report states (Report of Street Cleaning Division, p. 5):

"Under the above system of street washing it is found that the streets are almost entirely free from dust. Any dirt which may accumulate does not have time to be pulverized and the particles are too heavy to be disturbed or blown about by an ordinary wind. Under the old method of sweeping these heavier and coarser particles were removed, but most of the dust remained, to become a source of annoyance when disturbed by the wind or rapidly passing vehicles, although the streets might have appeared to the eye to be clean."

The cost of the work per one thousand square yards cleaned once is stated to have been as follows:

Hand Cleaning patrol system	$0.1753
Washing by Squeegee	0.1162

But as the washing was done on an average only one and one-half times per week the sum of the above figures do not give the correct average cost which, for 1000 square yards cleaned once, during a week (6 days) may be arrived at as follows:

Hand cleaning 1,000 square yards daily = 6,000 square yards per week @ 17.53¢. per m.	$1.052
Washing with squeegee 1,000 square yards 1½ times per week = 1,500 square yards @ 11.62¢ per m.	0.1743
Total for combined cleaning once of 6,000 square yards of street	1.1795
Equal to a cost per 1,000 square yards cleaned once of	0.1966

This figure seems very low, and probably could not be duplicated in many other cities where the business streets carry a much heavier travel, but it proves that this system of cleaning need not be unusually expensive.

The cost where the flushing machines were used is reported to have been 31.57 cents per 1,000 square yards cleaned once. Assuming that the streets were flushed one and one-half times per week, as in the case of the squeegee, the cost of the combined cleaning one of 1,000 square yards will be found to be 25.42 cents, which must still be regarded as a very reasonable figure.

It should be noted, however, that in neither case do these figures of cost include the value of the water used for washing. The quantity of water required per 1,000 square yards cleaned once as determined by trials in New York, is about 150 gallons for the squeegee and about 470 gallons for the flushing machines; but the cost of this water would be offset, in a measure at least, by the cost of that which would otherwise be used for supplemental sprinkling where the ordinary sweeping machine is used.

In order to keep this paper within reasonable bounds of space and time, I have dealt only with the sanitary aspect of street cleaning, but it should not be inferred that this is considered the only aspect of importance. Even if it were clearly demonstrated that unclean streets were not in any way deleterious to the public health, there would remain abundant reason for keeping them clean. Nor would that fact be likely to change the conclusions reached as to the proper method of cleaning the streets. From the viewpoint of public comfort and of economical considerations street dust must be regarded as the most objectionable part of street dirt. Its injurious effect upon foods and delicate household articles in dwellings, and upon the finer class of merchandise exposed in commercial extablishments cannot be definitely estimated in money, but is undoubtedly very great, and the damage thus done would much exceed any additional cost that the more thorough cleaning here advocated might entail.

SOME FACTORS IN THE EPIDEMIOLOGY OF POLIOMYELITIS

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Read before the American Public Health Association, Washington, D. C., 1912.

Notwithstanding the brilliant work of the last three years upon the experimental transmission of poliomyelitis, and the numerous painstaking epidemiologic studies of the disease, there remains, in the minds of practically all who have studied the subject, considerable doubt as to the means by which this infection is actually disseminated in nature. The explanation of this uncertainty is to be found, not in the incompleteness of the experimental work, nor altogether in the paucity of epidemiologic data, but rather in the seeming lack of harmony between experimental results and epidemiologic observations.

Experimentally it has been shown that poliomyelitis is an infectious disease, due to a filterable virus, easily, almost constantly transmissible to monkeys. It has quite recently been shown that the virus which is the specific infective agent may be present in the discharges from the naso-pharynx, the trachea and the intestines of persons suffering from poliomyelitis. It has also been shown that monkeys may, though not constantly, be infected through the nasal mucous membrane, and under somewhat artificial conditions, through the mucous membrane of the gastro-intestinal tract.

Lower animals other than the monkey have not been found susceptible to laboratory infection with poliomyelitis, with the exception of the rabbit, in which an atypical form of the infection may occasionally be produced.

The virus of poliomyelitis has been found, in nature, only in the organs and discharges of persons suffering with or recently dead of the disease.* To this statement there is one exception, namely, the finding of the virus in the dust of a room occupied by a patient suffering with poliomyelitis. The dust was presumably contaminated with the discharges from the patient and attendants.

The experiments showing the infectiousness of the discharges from patients and the possibility of infection taking place through mucous membranes not grossly injured, form a very convincing chain of evidence, if not actual proof that the disease is, in nature, transmissible directly from person to person.

The doubt as to whether this is the real means of transmission in nature has arisen because of the fact that even in epidemics poliomyelitis does not usually exhibit the characteristics which we are accustomed to attribute to contagious diseases.

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* See note at conclusion.

Making due allowance for rather numerous exceptions, the well-established epidemiologic characteristics of poliomyelitis are the following:

1. It has, both in epidemic and sporadic form, an extremely wide, not definitely defined geographic distribution, occurring all over the North American Continent, throughout Europe, in Australia, and quite probably in various other countries from which it has not been specifically reported.

2. While it has a distinct seasonal prevalence, it is not strictly limited in the season of its occurrence. The great majority of sporadic cases and practically all epidemics in the North Temperate Zone occur in the late summer and fall months, but cases do occur, in this latitude, in all months of the year. No well defined set of weather conditions can be said to be necessary to the occurrence even of epidemics.

3. Although we refer to poliomyelitis as "epidemic," its incidence in any large population is always small even during epidemics. Occasionally, in a small group of people, a large percentage may be attacked, but considering any large group, as the population of a city, a county or a state, the attack-rate, even in so-called epidemics is seldom more than one per thousand, usually even less.

4. As regards its incidence in various classes of the population, poliomyelitis occurs with approximately the same relative frequency among those living under the best of sanitary and hygienic conditions as among those living in the most squalid environment. It is a disease not closely associated with so-called unsanitary or squalid conditions of living. It is, indeed, a very general rule, both in this and other countries, that epidemics have been more intense and more virulent in thinly-settled rural and village communities where living conditions are fairly good than in the overcrowded slums of great cities.

5. In one respect, however, poliomyelitis is strikingly selective in its attack-rate upon a population, namely in that the vast majority of its victims are young children, from fifty to eighty per cent being under six years of age. Adults, though not exempt, are rarely attacked except during intense epidemics, where a relatively large part of the whole population is attacked. It would appear that among adults males are more frequently attacked than females.

6. Epidemics apparently spread with great rapidity or else occur independently over wide areas of country at about the same time. The New York epidemic of 1907 was accompanied, or rather followed by an outbreak in New England, reaching its maximum about a month later than in New York. Records of the epidemic of 1910 in Iowa show a fairly uniform radial spread from a primary focus in the north-central part

of the state to more distant parts. For example, there was a small epidemic in Hancock county in April and May. A considerable epidemic occurred in Mason City, in the adjoining county (Cerro Gordo), beginning in May and declining in August. In the county around Mason City the outbreak reached its maximum in September. In Grundy county, not far from Mason City, an epidemic occurred in August and September; and finally in Sioux, Woodberry and Plymouth counties, in the extreme west of the state, there was an epidemic in September, October and November.

7. As regards the epidemiologic evidence of contagiousness, it has usually been impossible, even in epidemics, to trace lines of contact from case to case. While some small epidemics have, indeed, shown all the characteristics of contagious disease, and while it is possible in almost every closely studied outbreak to find instances of apparent contact-infection rather more often than could be accounted for by coincidence, it is characteristic that the cases are scattered, occurring in persons who have never been in any sort of direct or known indirect contact with a previous recognized case. Not infrequently the patient is a child living far away from the nearest known previous case, and who has certainly not been away from home within a period of several weeks before the attack. Still more striking evidence of the non-contagiousness of poliomyelitis is afforded by the fact that one rarely finds more than a single case in a family, and still more rarely finds multiple cases in a family separated by such an interval as would suggest the infection of one from the other. Numerous instances can be cited where large numbers of children have been exposed in schools or institutions, to acute cases of poliomyelitis without the development of any secondary cases.

On the whole it may be confidently asserted that infection in the majority of cases of poliomyelitis can not be ascribed to direct contact with any previous recognized paralytic case, or any recognizable abortive case of the disease. Indeed, the fact that poliomyelitis occurs most commonly in young childen, the very class least exposed to contact with people outside their own family, is, of itself almost sufficient to exclude direct contact as a necessary or even highly important factor in the infection.

Taking a broad view of an outbreak of poliomyelitis such as has occurred in many of our states within the last three years, we have the picture of an infection becoming, within a very short time, disseminated over a wide area of country, attacking, however, only a very small percentage of the population of this area, attacking chiefly children under five years of age.

These points I may reiterate: the rapid spread over a wide area, as the whole of a large city or even a state; the rare incidence of the disease within that area, seldom as much as one case per thousand inhabitants; and finally, the enormously disproportionate incidence among children.

To account for this picture we must assume either an infective agent so distributed as to reach only one out of several thousand inhabitants, and reaching children much more commonly than adults; or we must assume an infection quite generally disseminated throughout the population of this area, but only rarely finding an individual in whom it can produce characteristic morbid effects. Granting an almost uniform and universal susceptibility to infection, then the incidence of the disease must be approximately coincident with the distribution of the specific causative agent.

Several hypotheses have been advanced to explain the irregular distribution of poliomyelitis, and in the present state of our knowledge, each of these deserves careful consideration.

It has been suggested that the lower animals are the chief reservoirs of infection, which is spread from them to man. Again it has been suggested that the dust of streets and barnyards is the chief source or vehicle of infection, and finally the suggestion has been repeatedly made that some insect is a necessary factor in the transmission of poliomyelitis. Each of these hypotheses has, in its support, certain facts which cannot be discussed within this space. None of them, however, adequately explains the rare incidence of the infection, the scattering of cases and the disproportionate incidence in children, without the additional assumption that the majority of persons are not susceptible to the infection. Whether the source of infection is the soil, domestic animals or man; whether the infective agent is spread from its source by dust, by insects, by domestic animals or by human carriers, speaking broadly it will be spread radially, so that as a very general rule those nearest the source will be most exposed to the infection. The grouping of cases in the immediate vicinity of the source of infection is especially striking in the epidemic diseases which we know to be transmitted from animals, or to be conveyed by insects, as, for example, in glanders, in plague, in yellow fever and in typhus fever. Again, none of our epidemic diseases known to be derived largely from domestic aminals or transmitted by insects is distinctively a children's disease. There is good reason to believe that adults are proportionately quite as much exposed to infection from these sources as are children.

Therefore, in order to make any of the above hypotheses competent to explain the epidemiology of poliomyelitis, we must couple with it the assumption that susceptibility to the infection is relatively rare, and that children are more susceptible than adults. In short, no hypothesis yet advanced is sufficient to account for certain characteristics of poliomyelitis, namely, its wide distribution, small total incidence and preponderance in children, unless coupled with the assumption of a large factor of variations in individual susceptibility.

On the other hand, granting, as appears necessary whatever the vehicle or source of infection, that the peculiar incidence of the disease is dependent largely upon variations in individual susceptibility, then its spread by personal contact is readily explainable, in harmony with the facts shown experimentally and closely analogous to what is known of other diseases whose epidemiology has been more thoroughly worked out.

Cerebro-spinal meningitis furnishes an excellent example of a disease which we now feel reasonably assured is disseminated by personal contact, but in which lines of direct contact are no more traceable than in poliomyelitis. It is only by laboratory methods that the mystery of the spread of epidemic cerebro-spinal meningitis has been solved. In recent years it has been demonstrated that a large number of the persons in communities where this disease is epidemic, harbor the meningococci in their naso-pharynx, without developing symptoms of meningitis; in other words, the infective agent of cerebro-spinal meningitis is apparently very widespread during epidemics, but the incidence of the disease is limited by the insusceptibility of the majority of people. The demonstration of meningococcus "carriers" serves, in this instance, to prove that susceptibility to the infection is relatively rare. In poliomyelitis, carriers have not yet been demonstrated,* but the epidemiological characteristics are those which we should expect of a carrier-borne disease. And it is these general characteristics, rather than individual instances of apparent infection by indirect contact, that lend probability to the idea of "carriers" forming the missing links in the spread of the disease by contact.

The two diseases are analogous in their constant endemic occurrence in sporadic form and their occasional occurrence in epidemics, which are characteristically of irregular distribution. They are further analogous in their comparatively small incidence in the total population, their preponderating incidence in childhood, the scattering of cases with no obvious lines of contact, and in the fact that each has a distinct though not absolutely limited seasonal prevalence.

To recapitulate, it is not the object of this paper to deduce a definite conclusion as to the means by which poliomyelitis is disseminated in nature. The facts do not appear as yet to warrant a final conclusion. It has been intended, however, to point out that of the hypotheses which have been so far advanced none is capable of explaining the epidemiologic facts without ascribing to individual variations in susceptibility a very important role in determining the incidence of the infection. Granting this, and taking into consideration the laboratory evidence of the contagiousness of poliomyelitis, the most probable hypothesis would appear to be that the disease is transmissible by contact,—by transfer of infectious discharges from person to person,—the lines of contact being obscured by the interposition between recognized cases of insusceptible persons who become "carriers."

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* See note at conclusion.

As to what constitutes susceptibility we are as yet ignorant. Epidemiologic studies should aim to collect data on this point by more intensive studies of the persons affected. If we can ascertain the conditions which determine susceptibility and immunity to this infection, it may be that we will be able to accomplish something in the way of prevention. If not, it must be admitted that the idea of transmission above suggested carries with it a rather pessimistic outlook as to the possibility of prevention.

Author's Note.—Since this paper was presented several highly important contributions have been made to our knowledge of experimental poliomyelitis. Kling, Wernstedt and Petterson, who had previously shown the infectiousness for monkeys of the naso-pharyngeal, tracheal and intestinal secretions of persons acutely ill with poliomyelitis have more recently announced that they have been able to demonstrate the virus in the buccal and intestinal secretions of well persons who had been closely associated with paralytic cases of poliomyelitis. In the monkeys infected in this way they were, however, unable to demonstrate the infiltrative lesions of the cord which have been considered characteristic of poliomyelitis. More recently Flexner, Clark and Fraser have demonstrated, beyond a question, the presence of the poliomyelitic virus in the naso-pharyngeal discharges of two apparently healthy adults closely associated with a case of poliomyelitis. Thus experimental proof has been adduced of the occurrence, in passive human carriers, of the virus of poliomyelitis.

Rosenau and Brues have shown that poliomyelitis may be experimentally transmitted from monkey to monkey by the bites of Stomoxys calcitrans, and their observations have been confirmed by Anderson and Frost.

Finally, Flexner and Noguchi have succeeded in cultivating in vitro the virus of poliomyelitis.

The additional evidence brought forward since this paper was prepared, while demanding a more careful consideration of biting insects, especially Stomoxys calcitrans, as possible agencies in the natural transmission of poliomyelitis, does not appear to the writer to necessitate any material change in the general conclusions above given.

SEASONAL DISEASES AND SEASONAL TEMPERATURES.

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Read before the American Public Health Association, Washington, D. C. September, 1912.

My subject is so large that it is necessarily one which can be treated only in general outline in the brief time at my disposal. The writings on various branches of this subject have been voluminous, and the principal facts connected with Seasonal Diseases and Seasonal Temperatures are well known. In this paper I shall only attempt to assemble some of these facts into new groupings, and to point out the interpretation which these groupings suggest.

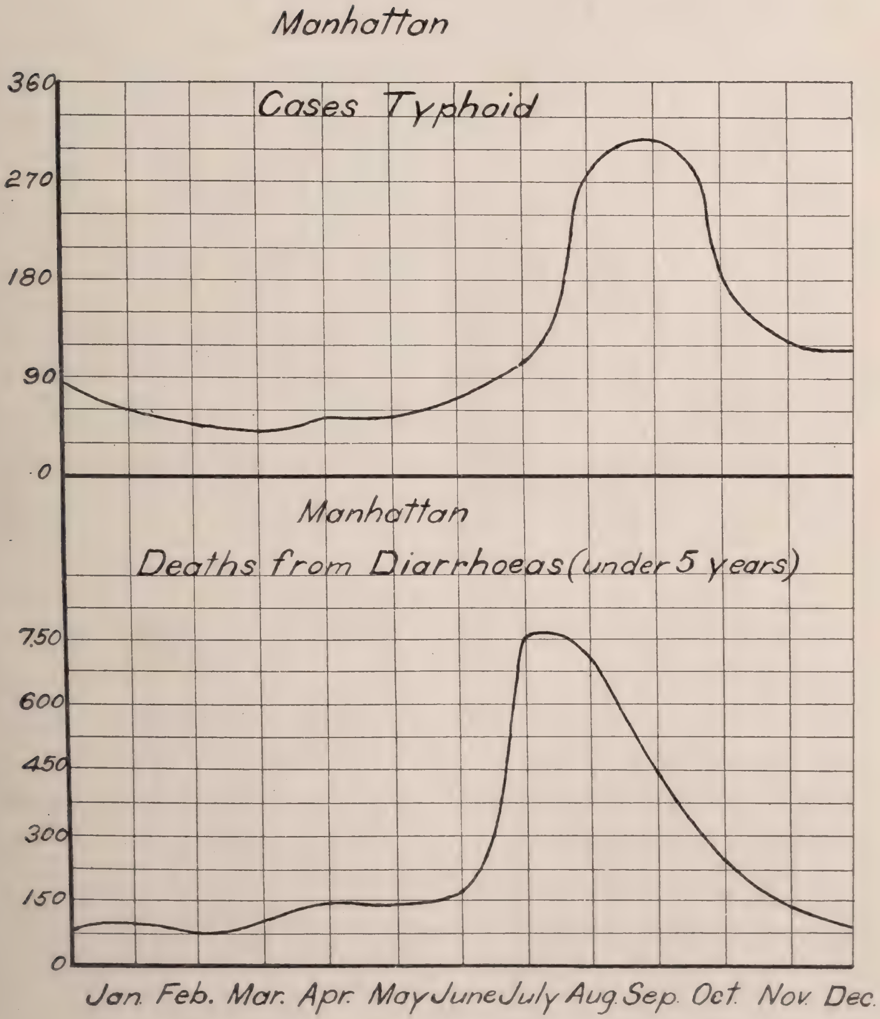
The majority of writers have not discussed the subject in its broad aspect, but have confined themselves strictly to the discussion of a single disease. Thus, there are numerous papers on Summer Diarrhœas of Infants, and on Typhoid Fever, and on Pneumonia, but there is but little literature devoted to pointing out any relation between these diseases because of their seasonal occurrence. On the other hand, the majority of writers have been chiefly interested in the bacteria or sources of infection and the means of transmission, and have devoted but little attention to a consideration of the effect of seasonal temperatures on the powers of resistance in the individual. While limiting their writings in these respects, yet a number of authors, especially in the discussions of the seasonal occurrence of typhoid fever, have come to the conclusion that there are certain broad underlying causes of the seasonal prevalence of this disease which have not yet been recognized. The chief purpose of this paper is to suggest that these broad influences relate to the effect of temperature on the powers of resistance in the human body and that they effect not only the seasonal prevalence of typhoid fever but of all other seasonal diseases.

The changes in the character of disease following seasonal changes in climate are greatest in the Temperate zones. Vital statistics in all large cities, both in the North Temperate Zone and in the South Temperate Zone, show the same annual rise and fall of cases and deaths in a number of important infectious diseases. There is a general regularity and parallel change shown by these vital statistics, so that those from any one of the larger cities will serve to illustrate the character of these changes. A survey of vital statistics shows that seasonal changes occur in three great groups of diseases. In the summer time and early fall, there is a rise both in adults and in infants in the number of cases and deaths from infections

I

Intestinal Diseases

1908



occurring through the intestinal tract. In the cold months there is a rise in cases and deaths from infections through the respiratory tract. In late winter there is a rise in the number of cases and deaths from infections which take place in the skin. As an illustration of these facts I show tables, Nos. 1, 2 and 3, which are taken from the vital statistics of the Borough of Manhattan, N. Y., in the year 1908.

Chart No. 1 shows the chief intestinal diseases both of which exhibit a marked increase in the number of cases and of deaths during and immediately after the warm weather. It is interesting to notice that the crest of the wave in typhoid fever is about a month and a half later than the crest of the wave in infant diarrhœas. Both of these waves reach their low point in January, February and March.

Chart No. 2 illustrates cases and deaths from inflammations of the respiratory tract and shows a wave which begins to rise in October and which reaches the crest in January, which continues until the latter end of March when the curve starts downward and reaches its lowest point in August.

Chart No. 3 exhibits the seasonal prevalence of diseases which are classified as Exanthemata—all of these cause skin eruptions. It is recognized, however, that the infection has its origin in the mucous membrane of the throat and later on displays itself in the skin.

It is interesting to notice that while the three diseases charted begin to rise in October and November and advance upward during December and January, that the crest of their prevalence is not reached until the month of March, somewhat later than the diseases listed in chart No. 2.

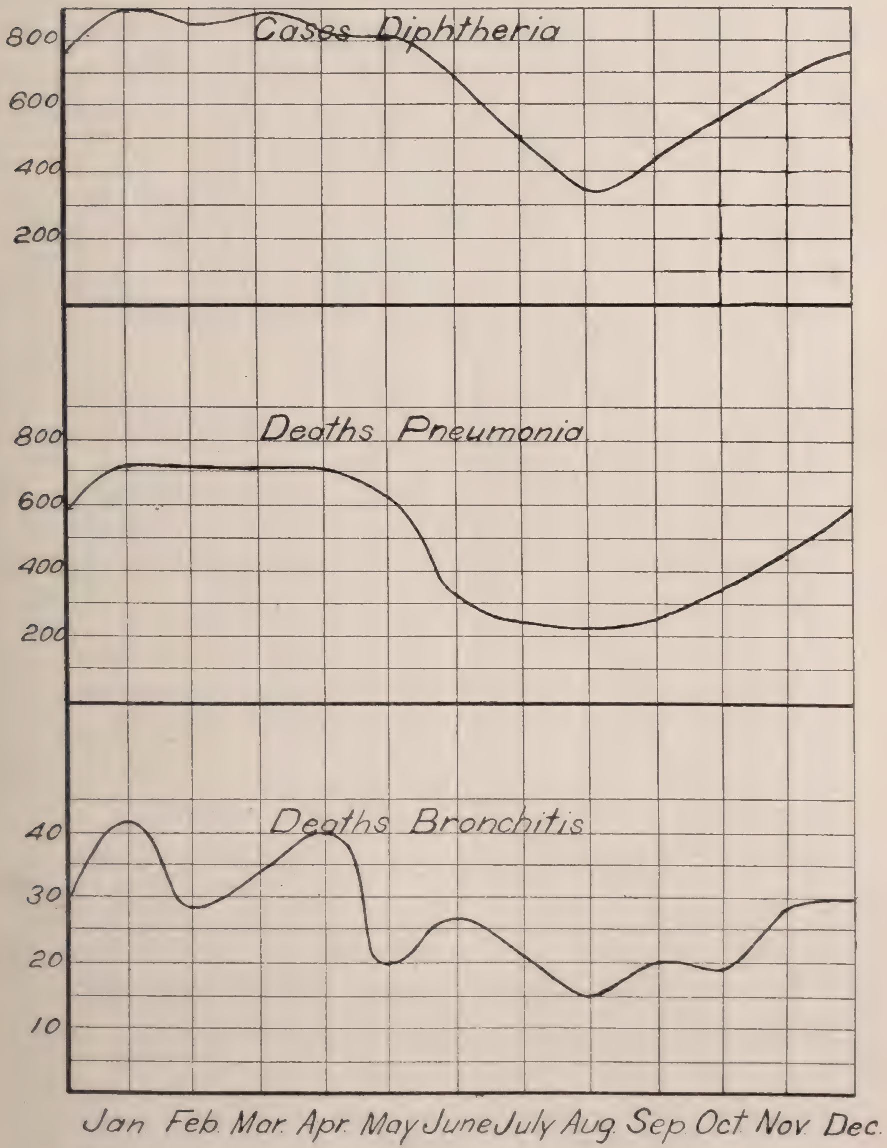
While there are modifications of the waves shown in these charts from year to year and from different cities, yet in a general way these charts correctly represent the rise and fall in both the North and South Temperate Zones of the three great classes of diseases caused by infections of the intestinal tract, the respiratory tract and the skin.

One cannot consider this annual rise and fall of diseases of this type without feeling certain that they bear some relation to the annual changes of climate which regularly take place. It is worth while to consider for a moment the relation existing between the sun and the earth and just what are the seasonal changes in their relations from the standpoint of the astronomer. In chart No. 4, is shown a diagram of the position of the sun and the earth in the summer time in the North Temperate Zone. At this period the sun is directly opposite a point 23½° north of the equator. The direct rays of the sun, therefore, shine in the territory north of the equator, and the situation is one in which for a few months at least the tropical climate is moved north. The oblique rays of the sun which do not strike

II

Respiratory Diseases

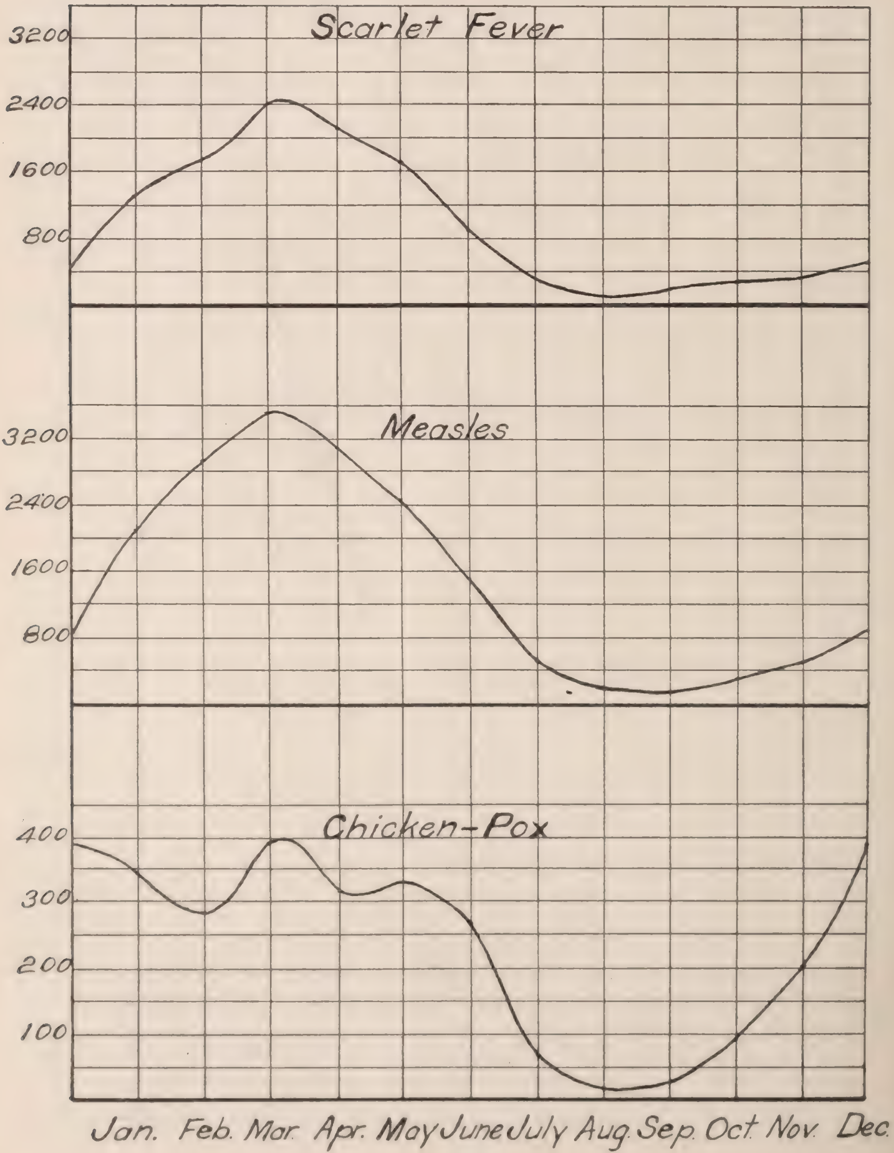
Manhattan
1908



III

Skin Diseases

Cases in Manhattan
1908



the earth directly cover those portions of the earth's surface in which the climate is cool and in which the winter season prevails. During the period of the year that the chart represents, the cold climate of the south polar region has crept northward and invaded the South Temperate Zone. In the Northern Hemisphere the cold climate has also crept northward until it is practically limited to the northern Artic region.

In these zones of temperature we find corresponding zones of disease. Thus in the chart, the portion of the earth receiving the direct rays of the sun in the North Temperate Zone is suffering from an increase in intestinal inflammations. On the other hand, the South Temperate Zone, which has been invaded by cold from the southern polar region, suffers at the same time from an increase in respiratory and skin diseases. It is obvious that there are certain zones in which extreme conditions are fairly constant. In both of the Arctic Zones the temperature is constantly cold, and in the Torrid Zone it is constantly hot. There is no space to discuss the conditions prevailing in these regions, but, in passing, it may be suggested that the constancy of extremes of cold on the one hand, and of heat on the other, may tend to develop a considerable degree of immunity to the effects of these conditions upon the inhabitants of these regions.

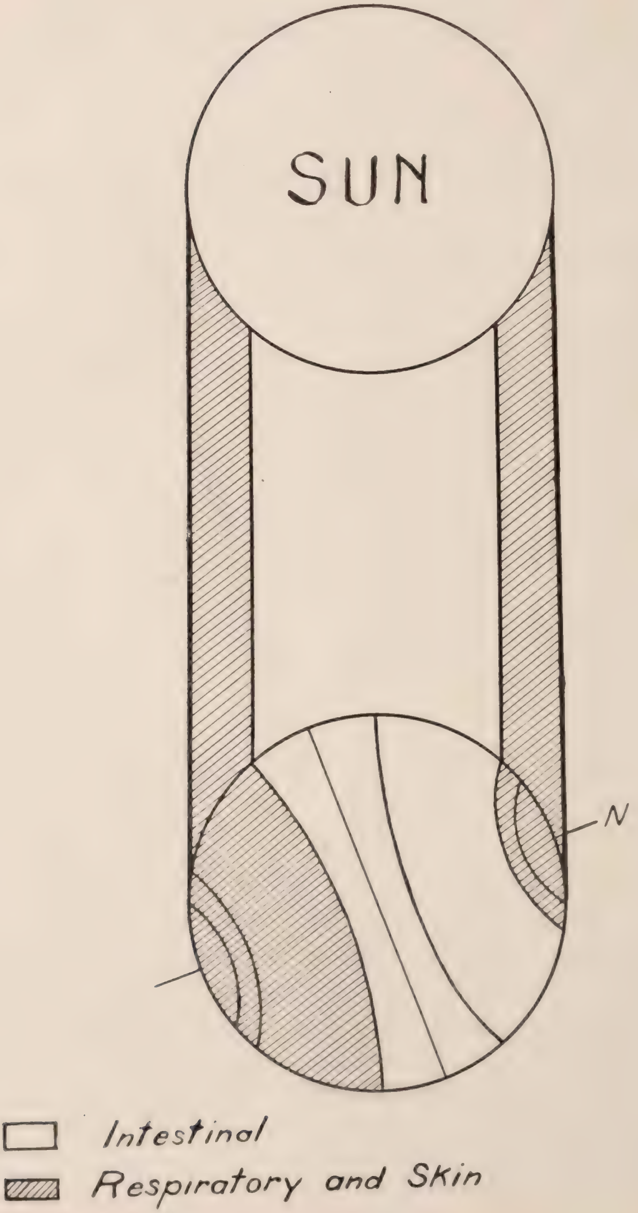
It must be admitted that temperature changes are by far the most prominent characteristics of the changing seasons. Humidity is, without doubt, also a factor, but this is secondary to temperature. There are three relations of temperature to seasonal diseases, and each must be considered separately. First, there is the relation of temperature to human beings; second, there is the relation of temperature to the infectious agent itself, or to the bacteria causing infectious diseases; third, there is the relation of temperature to the means of transmission of the infectious agents from their sources to the bodies of men. I cannot undertake to present all three phases of this question, and will confine myself chiefly to the relation of temperature to human beings.

It is recognized that there is a certain normal temperature in which the human body conducts its processes to the best advantage. There are temperatures which are too high and there are temperatures which are too low for normal life. When the surrounding temperature is either above or below the normal, the human body attempts to adjust itself to these changes by the alteration of certain internal physiological processes. During warm weather the human body tries to rid itself of excess heat, or in other words, tries to keep cool; during cold weather the body tries to prevent the loss of heat to keep warm. These adjustments are accomplished as follows: During warm weather moisture is evaporated from the surface of the skin and from the surface of the respiratory tract, and thereby excess

IV

Sun and Earth

Summertime North Temperate Zone



heat is released. At the same time the intestinal tract reduces its absorption of food products and increases its absorption of liquids. The body does not require the number of calories of heat, which it obtains from large quantities of food. The intestines and digestive organs cease to work at full power and heat production is reduced.

In warm weather the intestinal capillaries are closed down to a considerable degree, while the capillaries of the lungs and skin are largely expanded. When the blood supply is at its maximum in any tissue, its powers of resistance are at the maximum. The bacteria of infectious diseases find it more difficult to invade the tissue in which the capillaries are expanded to their full power than to attack the tissue in which the capillaries are shrunken and from which the blood supply has been taken. Thus, the first step in inflammation is congestion, which means that the irritation caused by the attack of the bacteria, or other irritant, is being opposed by the automatic action of the capillaries which bring a rush of blood to that part as a defence against the attack.

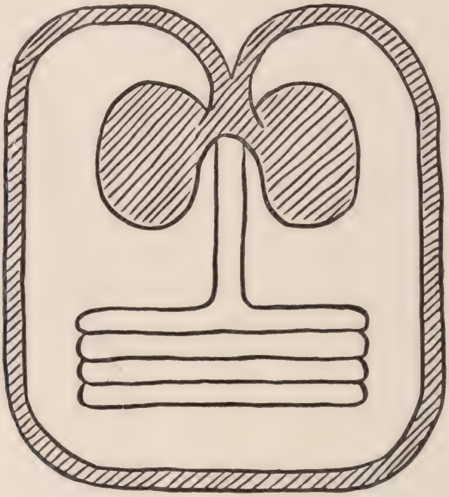
During warm weather the lungs and skin are filled with blood due to the expansion of the capillaries in those parts, and consequently the powers of resistance of the surface of the skin and of the respiratory tract are at the maximum. On the other hand, the intestines have shrunken capillaries because their activities are reduced and consequently the powers of resistance of the surface of the intestines is greatly impaired. Students of infant mortality have often mentioned their belief that the summer diarrhœa of infants is due to the paralysis of the intestines during the hot days. Digestive inactivity shows itself in loss of appetite during hot weather in adults as well as in infants.

In winter just the reverse conditions prevail. During cold weather it is necessary for the body to supply itself with an abundance of heat through its food. Consequently, the digestive organs are working at their full capacity and the capillaries of the intestines are fully expanded. Heat production is at its maximum. On the other hand, loss of heat through the surface of the skin and of the respiratory tract is prevented by the shrinkage of the capillaries of those parts, so that evaporation is reduced to its lowest terms. As a consequence, the powers of resistance of the skin and the respiratory tract is relatively reduced, while the power of resistance of the intestines is greatly heightened.

This, in brief outline, suggests the chief reason for the seasonal waves of the three great classes of infectious diseases. Such a broad generalization as this may seem somewhat daring, and it is with some degree of timidity that I advance it. The argument in its favor, however, depends not only on the fact that intestinal diseases are increased in the hot season, but that respiratory and skin diseases are decreased at the same time. In the same manner the argument is strengthened by the fact that in the cold weather respiratory and skin infections are not only increased, but intestinal infections are decreased at the same time. In other words, not only the crests of the waves, but also the hollows of the waves furnish the evidence.

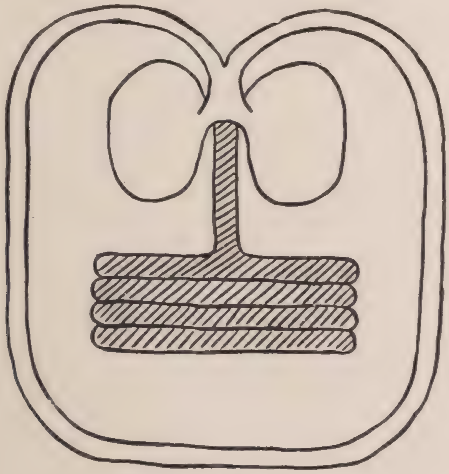
The seasonal ebb and flow of blood in the capillaries following seasonal changes in temperature are illustrated in Charts Nos. 5 and 6.

Chart No. 5 shows the summer blood supply in which there is congestion in the respiratory tract and skin, with pallor in the intestines. Chart No. 6 shows the winter blood supply in which there is congestion in the digestive tract and pallor in the lungs and skin.



V. Summer Blood Supply.

I will touch only briefly upon the effect of temperature on the sources of infection. Bacteriologists are more and more satisfied that the chief sources of infectious diseases lie in the chronic carriers of the infectious organisms. Tuberculosis carriers have been known the longest. Typhoid carriers within recent years have become well recognized. Diphtheria carriers are beginning to be discovered, and eventually carriers of every infectious disease may be shown to exist. The chronic carriers who keep the infectious organisms in their bodies and dwell among us unrecognized, carry the infectious agents onward from season to season and are the real sources of the annual outbreaks and waves of infectious diseases. If what has already been said in this paper is true of those persons who are in good health and normal condition, the same seasonal capillary changes must take place in the chronic carriers of infectious diseases. In other words, there must be certain seasons of the year when those who are chronic carriers of infectious diseases find conditions where the bacteria which they carry are more easily multiplied and in which their diseased condition is exaggerated, while there are other periods of the year when the bacteria which inhabit these carriers are met with a vigorous resistance in the tissues in which they are located and are consequently greatly reduced in their numbers and activities. Personally, I have had only one opportunity to test this theory experimentally. On a typhoid carrier tests made daily for almost the entire month of February showed that on only one day was it possible to secure typhoid bacteria from his intestinal discharge, and then only in very small numbers. Tests from this same carrier in September and October showed large numbers of typhoid bacilli on consecutive days during a period of three weeks.



VI. Winter Blood Supply.

The effect of temperature on the means of transmission must be dismissed with scarcely a word. In general, intestinal diseases are transmitted by food and drink while respiratory and skin diseases are transmitted by air. I will only take space to suggest that the great increase in motility of human beings as a result of warm weather multiplies the risks from foods and drinks, and also that the quantity of liquids consumed is greatly increased. On the other hand, cold weather reduces human motility, reduces the number of risks from foods and drinks, and at the same time leads to indoor confinement and the breathing of polluted air.

This short paper is really a preliminary note and outline of an argument based on material which has been collected during the past two years, and which will be used for a larger publication on the same subject in the near future.

THE USE OF BISMUTH SALTS IN MEDIA TO DETECT THE FORMATION OF SULPHUR BODIES OF BACTERIAL ORIGIN.

A Preliminary Note.

SAMUEL T. DARLING,
Ancon, C. Z.

During an investigation of the effect of bismuth subnitrate on intestina bacteria and pathogenic entamœbæ, I observed that the stools which became quite black after the administration of large quantities of the drug contained many crystals of bismuth subnitrate, the surface of which had become coated with bismuth sulphide. The crystals of bismuth subnitrate were not disintegrated but had taken up the hydrogen sulphide generated by the intestinal bacteria. In addition to this, I was struck by the enormous numbers of micrococci and bacteria which were jet black in color evidently due to the absorption or assimilation of bismuth and its conversion into sulphide.

On account of the facility with which bismuth subnitrate is sulphuretted by certain micrococci and bacteria, it was thought that it might be used to advantage for the detection of sulphide-formers among water bacteria and for the detection of sulphur bodies of bacterial origin, and a series of comparisons was made with bismuth and lead acetate media. It was seen that bismuth subnitrate broth possessed certain advantages over broth prepared with lead acetate as usually advised for the detection of sulphide-forming bacteria, for a number of microörganisms were stained black or stained the media brown or black in bismuth broth, which exhibited no such changes in lead acetate broth. Inasmuch as the object of the lead acetate media is to demonstrate by a color reaction the formation of hydrogen sulphide by a microörganism, it would seem that if bismuth has a wider or different range of usefulness for this purpose, it should be employed instead of lead or in combination with it. I can find no references in the literature at hand to the use of bismuth salts for this purpose.

Apparently, intestinal micrococci and bacteria, particularly those concerned in putrefaction, have this power developed to a considerable degree. Their cytoplasm may contain notable amounts of protoplasm containing sulphur in such a linkage that bismuth sulphide is formed with some avidity. On the other hand, these or other microörganisms may excrete hydrogen sulphide into the media and thus lead to the staining of the medium with black or brown bismuth sulphide.

A large gray rat was killed and the stomach tied off from the rest of the intestinal tract. About two inches of the small intestine and two inches of the colon were similarly tied off. Each chamber was injected with a suspension of bismuth subnitrate in distilled water. The intestines were replaced and the rat placed in an incubator. After twenty-two hours, there were no evidences of bismuth sulphide in the stomach (acid reaction), but in the small intestine and colon the bismuth had become blackened. This suggests that the reaction takes place in a neutral or alkaline medium with bacteria of fœcal type.

The action may be of two kinds. Hydrogen sulphide or sulphur radicals may be liberated from the bacillus into the media. In this event the media is stained. Or the blackening may be due to the intra-cellular assimilation of bismuth and the intra-cellular formation of bismuth sulphide, when the microörganism itself is stained.

The bismuth subnitrate broth was made up in two strengths 0.1 per cent. and 2.0 per cent., *i.e.*, bismuth subnitrate added to bouillon in these proportions. Two per cent. broth is not inimical to the growth of most bacteria.

The typhoid colon group as far as was investigated did not give the reaction, for *B. typhosus* and *B. paratyphosus*, A. and B. were inoculated into bismuth broth 2.0 per cent. yet bismuth sulphide was not formed at the end of twenty-two days and sub-cultures were viable.

Intestinal bacteria recovered from Endo plates made from stools were transferred to bismuth subnitrate and lead acetate broth 0.1 per cent. The bismuth broth after twenty-four hours showed a black deposit, which upon microscopic examination was seen to be due to a staining of the bismuth in the media, for the bacilli were quite colorless. Here the bacillus is excreting hydrogen sulphide. When stained, the bacillus is seen to be Gram positive, thus showing that there is no relation between the gram staining and bismuth staining. After a lapse of sixteen days, the bismuth broth was quite black and microscopically contained many blackened bacilli and much blackened bismuth subnitrate. The lead acetate broth showed some bacteria stained brown, though not so many, nor were they so deeply colored as in the bismuth broth, but there was much brown lead sulphide.

Several colonies from Endo plates gave a black sediment due to sulphuretted bismuth subnitrate, while the bacilli present were colorless and Gram positive.

Samples of water from the Zone reservoirs having a sulphurous odor on standing were inoculated into bismuth and lead acetate broth. After twenty-four hours, the sediment in the lead tubes was slightly darker than that in the bismuth broth although both were well stained. After several weeks, the tubes were equally discolored although the bismuth tubes contained many black stained cocci while the lead tube contained many colorless bacilli.

Forty-one colonies from plates of fœces were inoculated into bismuth broth 0.1 per cent. Forty out of the 41 grew in the media, which became brown or black during a period of seventeen days, and the reaction in all was alkaline.

Eleven gelatine liquefying colonies from fœces were inoculated into 2 per cent. bismuth broth. All the tubes developed an alkaline reaction. Nine were blackened, while the color of two was unchanged, and the black color microscopically was due to the blackening of the entire microörganism or to certain granules within it.

The reaction with Bismuth is noted fairly constantly among micrococci. When bacilli are blackened, it may be done *en masse* or by deposition in the ends or in excentrically placed granules. Sometimes as in bacilli of the *Aerogenous capsulatus* type, the spongioplasm of the bacillus is marked out in black, suggestive of the picture seen when these bacilli are stained by Gram and overwashed with alcohol.

The black staining of bacteria grown in bismuth broth is not a reaction with metachromatic granules for several cultures of *B. diphtheriæ* were inoculated into bismuth and lead acetate broth, and, though the growth was positive, yet scant, there was no blackening of either broth or bacilli.

The bismuth reaction is noted oftenest when the reaction of the broth has become quite[1] alkaline.

The black granules are not spores, for *B. anthracis* was grown for two weeks in 0.1 per cent. bismuth broth without definite blackening of the bismuth, and the bacilli and spores remained colorless.

The observations noted here it is believed will be of value in connection with the detection and study of microörganisms which liberate H_2S, or which assimilate bismuth in such a way that bismuth sulphide is formed intracellularly. The phenomenon may have a range of application aside from the detection of sulphide-formers and may be utilized for the differentiation of species as well as in connection with questions relating to the physiology of bacterial protoplasm and the assimilation of salts of heavy metals.

These observations also lead one to the opinion that the staining of bismuth subnitrate and lead acetate media is not always due to the excretion of hydrogen sulphide as is generally believed, but may also be due to the assimilation of these heavy metals by certain microörganisms and the formation of metallic sulphides, by sulphur not necessarily existing as hydrogen sulphide but due to the intracellular splitting off of sulphur or sulphur bodies by hydrolysis autolytic or other enzyme action.

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[1] Johnson, T. B., Jour. Biol. Chemistry, 1911, IX, 442, 443, in discussing sulphur linkages in proteins notes "that proteins and cystine are decomposed by alkali with formation of alkali sulphide . . . and that it is not inconceivable that in the digestion of proteins with alkalies there may be atomic displacements involving the removal of unsaturated sulphur, as in $C = S$ which can even occur before the cleavage of the protein itself and the liberation of the cystine molecule."

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NEW YORK PUBLIC HEALTH COMMISSION.

A particularly interesting and important document is the report of the Health Commission appointed by the governor of New York to inquire into the public health situation of that state with a view to recommending improvements in the sanitary laws and their administration.

As was to be expected, particular attention is paid to the situation in the rural districts where the mortality rate has not declined as rapidly as in the cities and has for some years stood at a higher point than the urban death rate.

The commission makes many recommendations, of which the most important are for lengthened tenure of office and increased compensation of the State Health Commissioner; the creation of a Public Health Council, which shall have the power to adopt a sanitary code for the state outside of New York City, but without administrative authority of any kind;

the establishment of not less than twenty sanitary districts in the State outside of New York City with an expert sanitary supervisor in each, devoting his full time to the work and appointed by and responsible to the State Commissioner of Health. These recommendations all point toward the closer supervision of health administration by the State Department of Health and with authority sufficient to insure results.

The commission further recommends that the duties of health officers of towns and villages shall be specifically defined and a minimum compensation fixed. There are also included recommendations for the improvement of the vital statistics, the extension of visiting nursing under official auspices, strengthening of the tuberculosis law and increased provision for tuberculous patients, the development of work in child hygiene, the extension of the State's laboratory facilities, the regulation of midwifery and wide extension of the educational activities of the State Department of Health.

It is recommended throughout that the proposed plan shall not deal with New York City, but that no other territorial exception be made. This exemption simplifies the problem and is probably a wise one.

The report has been transmitted to the Legislature with a strong recommendation from Governor Sulzer that its provisions be enacted into law. The entire country will watch its progress with close attention.

While the commission was forced to make its investigations and formulate its recommendations in a very short time and recognizes that certain points of importance remain for future investigation, the report as it stands is a most valuable contribution and, if its recommendations be carried out, the State of New York will be placed in a position to accomplish more in the public health field than any other commonwealth in the country.

SPECIAL NOTICE TO MEMBERS OF THE AMERICAN PUBLIC HEALTH ASSOCIATION.

A revised list of membership of the American Public Health Association is now being printed. The Secretary earnestly requests that he be notified at once of any changes of address or other alterations, so that the list may be accurate.

THE IMPORTANCE OF NEGATIVE EUGENICS OR THE PREVENTION OF ILL-BORNNESS.

DR. WOODS HUTCHINSON,
New York, N. Y.

Read before the American Public Health Association, Washington, D. C., September, 1912.

Eugenics is the art of the intelligent selection of our own parents. Unfortunately, most of us were not consulted as we should like to have been, about that matter, but we can see that the next generation is to some degree consulted. The problem of the method of preventing some of the unfortunate results which we see about us on every hand is one of the most vital and important things that confront us, not merely as sanitarians, but as humanitarians and as lovers of our kind. In the beginning, as most of you are aware, the direction taken by the eugenic movement, started under the brilliant and able leadership of Sir Francis Galton, was toward careful promoting of the mating and reproduction of the especially and peculiarly fit. That raised the question as to who should decide who were the specially and peculiarly fit, who were to be endowed and bowed down to by the rest of the community, and not unnaturally, those who first began this movement selected their own class as the class that ought to be so endowed. And from that point of view, eugenics began. There were to be special classes of individuals and careful study was made, statistical study, if you please, showing how much more valuable, how many times more valuable to the community the child of a professional man or a well-to-do merchant was than the child of a day laborer, and how much more valuable still was the child of one of our great families. That was the principle on which the plan of campaign was to be conducted, but as soon as that began to be worked upon, we were faced with many objections.

In the first place, we found that while we would like very much to promote the reproduction of the fit, none of us know enough to determine accurately who were the fit and who would reproduce the highest type of the future individual. We don't know what the future man is going to be like. Mr. Bernard Shaw thinks he knows, but he is the only man who has even ventured to express an opinion in that regard. We don't know what to breed to. We have to keep the human animal plastic and open to response and above all things, avoiding all kinds of specialization or fixing of type. We are middle-of-the-road animals and have won our victory by being able to beat every other animal at its own game and in its own game and in its own element, and only by keeping that up will we succeed in improving the future of the race.

In the second place, we found that all our comparisons with the lower animals were vitiated by a serious fallacy, that while we could produce certain changes in the lower animals at will, by selection, those changes were not for their benefit; they did not improve them from their point of view or enable them to compete better in the struggle for existence, but were made for our benefit; and the proper selection of the human breed will not stand comparison for a moment with the attempt at so-called improvement and development of high grade stock in other types of animals. The third thing we discovered was that the genius was a remarkably rare and fortunate accident and that the very fact of a genius having appeared in a family was pretty good evidence that there wouldn't be any more geniuses in that family for at least twenty or thirty generations; and finally we found that when the community had acted upon the principle of endowing the successful man with titles and official position, or landed estates in the hope that he would produce a class of people of greater value to the community, what really happened was that the brilliant and able man married a commonplace wife and produced commonplace children. So that we locked up, for the benefit of not more than 3 to 5 per cent. of the community, something like 30 or 40 per cent. of the resources of the right or primogeniture and by the unrestricted right of inheritance of private property, which is one of the things that will have to go down in the future. We had succeeded in starving and crushing out and killing at least five to ten geniuses in the great 70 per cent. of the people for every one we bred to order in the upper 5 per cent. of the community.

So the next line eugenics decided to take up, was the negative side, preventing the reproduction of the obviously and clearly unfit. Here we had the advantage of having a criterion about which there could be no two opinions. It was perfectly possible to establish a criterion of normality and everyone falling below it was to be regarded as an unfit and undesirable type to reproduce, and it was not very long before we began to make the exceedingly interesting and most encouraging discovery that the larger part of those qualities which rendered the individual unfit for competition were things handed down to him from his ancestors and which would be handed down by him to his descendants. I need not detain you with the statement of the actual results of these investigations. They are familiar to practically all of you. But it was found that about from 2 per cent. to 3 per cent. of the community were congenitally defective and from that 2 per cent. to 3 per cent. sprang the enormous mass of our feeble-minded, of our epileptics, a large share of our insane, a large share of our prostitutes, a majority of our criminals and the vast mass of our paupers and tramps;

that we had gathered together, as it were, in one stream and one line, a tremendous number of the undesirable and unfit element of society.

Plans were proposed at once for the limitation and the cutting short of the further perpetuation of this type of individual and this contamination of the race stream, this pollution of the blood of the community. The most careful investigations have shown that never, from a feeble-minded father and mother has been born a normal child—no instance has been brought forward where that miracle has occurred, and according to the percentage of defects, obvious or concealed, which exists in the parents, so will be the percentage of defects in the offspring. These conditions emphatically breed true and if we can manage to break this stream in one way or another, we shall succeed in stopping an immense number of these defectives and misfits of our human species. The method suggested for doing this is the simple one of extending the care of the schools so that intelligent experts in mental development, intelligent physician, and a born teacher, shall examine every child in the community, certainly as early as three years and preferably earlier, and watch for the development of the little peculiarities, showing these hereditary defects. When those defects are discovered, those children should be taken and placed in a special environment out in the country under the most favorable and happiest circumstances and trained and developed to the highest pitch they can possibly be, but prevented from reproducing their kind by permanent segregation. When this has once been done, it would only be a few decades before we should see a rapid falling off in the percentage of pauperism, crime, insanity, epilepsy and feeble-mindedness.

The question is now, are we producing this defectiveness, this feeble-mindedness, these hydra-headed forms of defectiveness, is it a breakdown under the strain and stress of civilization, or is it merely the persistence from an almost indefinite period in the past, or radically defective strains?

In other words, are we manufacturing our defectives or are we merely perpetuating the defectiveness which has been inherited from past generations? On that subject a great deal of admirable work has been done, resulting in the conclusion that we are not manufacturing defectives, that the strains of civilization are not producing mental defects which manifest themselves in the form of feeble-mindedness, epilepsy, insanity and crime, that these are not increasing under civilization, but that we are simply perpetuating, from some far period in the history of the race, a strain of mental and physical defects. It is merely an arrest of development, the lowest type of the feeble-minded is the individual whose development is arrested at about the age of the child of two; the next lowest is one whose mental development is arrested at about the age of a child of six, and the next lowest is one whose development is arrested at about the age of a child of nine, and so on, until, if we go very much further, we might begin to make invidious personal comparisons which would not be altogether—well, you don't want to carry anything too far, as Doctor Sedgwick said. The situation appears to be that there are two great reservoirs of this mental defectiveness, one of them being, not the city slum, for that has a lower percentage of feeble-mindedness, epilepsy and insanity than the poorer and remoter class of open districts which are the real rearing places for our defectives and feeble-minded. The little colonies which dot our country all over from the fisher villages of Nova Scotia and the coves of the Allegheny Mountains, to the pine barrens of the Southern States and the swamping river-bottoms of the West. Probably everyone of you has known of some such community of chicken thieves and drunkards and paupers and feudists and smoke-house robbers who live off by themselves and interbreed, protected from elimination by the very low grade of their surroundings and the small amount of strain which is brought to bear upon them. They live like animals because they have an animal mentality and are placed under animal surroundings.

The other reservoir for that defective strain is the group of privileged doodlewits at the other end of the social scale, whose eccentricities have been carefully preserved and protected from the foolkiller on royal thrones and in millionaires' families, in Four Hundreds and upper Ten Thousands and groups of that kind, safe from the competition and pressure which would otherwise have wiped them out of existence. In the intermediate and lower ranks of life there are not so many of those defectives, but there are historical instances that recall themselves, of a magnificent succession of degenerates. Indeed if sterilization of defectives had been insisted upon in the past at least three royal houses in Europe would have been put out of business generations ago. I do not mean to say that there is naturally any greater proportion of defectiveness among them than among other elements of society, but they are maintained by their family and rank and kept in a position where that defective strain can spread and trickle downward; it is even considered an honor by the remainder of the community to have it mixed with their blood. The question to what extent two great sources of deterioration produce this defectiveness is, I think, worthy of a moment's attention. They are the two great curses of civilization, alcohol and syphilis. Is it true that we are filling our jails and asylums and homes for dependents, because of the use of alcohol and the prevalence of syphilis, or is the relation the reverse action? That is, that alcohol is a germ poison, picking out the weak individuals and detecting the weak spots in the community, instead of actually causing them? The general trend, I think, of investigation, tends in favor of the latter view. We can hardly imagine it to be otherwise when we remember the way our ancestors used to boast of the number of bottles of port they could carry. We would all have been dead long ago if mere alcohol had been sufficient to produce defectiveness. I don't know whether any of you remember the standards that obtained when the first temperance society in New England less than a century ago was formed. Its pledge ran as follows: "We, the undersigned, believing in the evil effect of strong drink, do hereby pledge ourselves on our sacred honor that we will not get drunk more than four times a year, Muster Day, Fourth of July, Thanksgiving and Christmas." That was the beginning of the first temperance society, and a community, which could stand such potations and saturations as that, is not going to be seriously damaged by the drinking that is going on at the present date. I believe that those two conditions, instead of producing defectiveness, merely pick it out and we should regard the drunkard and the individual who goes insane from syphilis as emphatically not to be trusted to reproduce the race. That our laws as regards divorcing such individuals should be made practically self-acting instead of encouraging good women to marry men of this description in the hope of reforming them by their Christian principles and their good example; that, I think is distinctly immoral, I care not who has upheld such a position.

The last bearing of this question that I would like to call to your attention is as to the amount of this type of defectiveness. Of course, we can pile up perfectly enormous and appalling figures running up into the hundreds of thousands, of the different types of defectives—feeble-mindedness, criminality, insanity, prostitution, etc., but, taken altogether, they do not come to more than 4 per cent. or 5 per cent. of the total community, 95 per cent. of the community are born normal and sound and the vast majority of us, no matter what strains we should be subjected to, are hopelessly and monotonously sane, not even cranky enough to be interesting. The general average of the race is high and good, and the real field of eugenics, in my judgment, is the recognition of this fact, first of all. By all means, weed out, by appropriate and kindly segregation, those unfortunates who have been born accursed and prevent them from passing on that tainted plasm to the next generation, and we should soon see a marked improvement in affairs. The next thing is to alter our attitude to the great mass of the people—and that has been the most serious and dangerous result of this strain of defective plasm in the race. We have actually taken, in our inspired intelligence, that 2 per cent. or 3 per cent. of defectives as the creatures which all men would become if they were not held down by the strong hand of the law or upheld by the support of religion. We have pictured 2 per cent. or 3 per cent. of defectives as the basal type of the entire community and have allowed that to color our laws, our prison regulation and our methods of what we are pleased to term justice, until we have produced a code which, for savagery, stupidity and ineffectiveness to 97 per cent. of the community was never needed for a moment, except by the 3 per cent. of unfortunates at the lower end of the scale. We should recognize that the tendency of 95 per cent. of humanity is upward and forward and that the vast majority of men would be law-abiding if there were no laws. That the place where our geniuses and our great men and desirable individuals are bred and born, is in that 75 per cent. to 85 per cent. of the race, which is the backbone and seed bed of every people, and that the main thing needed in eugenics is to preserve and conserve the virtues of the heredity of 90 per cent. of us. I believe that we shall come to feel more and more that the man who is to be chiefly regarded is the average man and not the exceptional man, neither the exceptionally and unnecessarily good nor the exceptionally bad. That the people to whom we should direct our attention and for whose welfare we should work, are, in Lincoln's phrase, "the great, plain people whom God Almighty must have loved, because he made so many of them."

THE NEED FOR GENERAL HEALTH-PROTECTIVE SURVEYS AND PROGRAMS.

M. N. Baker,

President, Board of Health, Montclair, N. J.; Editor, Engineering News, New York City.

Read before the American Public Health Association, Washington, D. C., September, 1912.

Efficient work in any field demands a well-conceived program. Before such a program can be prepared the field must be surveyed in order to ensure a program, the several parts of which shall be rightly proportioned to each other and to the whole, shall not overlap unduly, and shall have a proper sequence of time. This is notably true of work in the health-protective field, the area of which is so large, the boundaries of the whole and of its many parts so uncertain and the topography so varied.

What and how large is the health-protective field? It is as true of this field as was once said of another one, "the field is the world." For most of us, however, the field is limited to a single commonwealth, a city or, perchance, to a small town or even a village. But however small the field, a program is needed for continuous efficient work and before the program must come the survey.

Dropping, for present purposes, that conception of the health-protective field which would make necessary a world-wide survey and program let us firmly grasp the idea that one of the greatest needs of the day is a public health program which will definitely assign to the federal, the state and the local governments each their own parts and establish for each the metes and bounds within which it shall confine its labors. Such a delimitation of the health work of the nation, the state and the city is not easy, for the diseases with which we are contending are checked in their spread by no governmental boundary line.

Looking at the subject thus broadly it might be supposed that health-protective work should be essentially national in character, with the several states subordinate to it and the minor civil divisions subordinate to the states. But, in the United States, at least, we have no federal health department and even if we had, our federal government has no power within the several states except such as was conceded to it by the states in framing and adopting the Constitution. Among the powers given over by the states to the nation, control of health matters is not mentioned—not even by implication, except in the "general welfare" and interstate commerce clauses of the Constitution. This is not so much an omission due to the fact that public-health work was unknown in 1789 as would seem at first thought, for it should be remembered that health regulation is founded on general police powers, which were sufficiently well developed when the Constitution was framed to leave no doubt that the several states had no more intention then than now to delegate their police powers to the general government.

It is true that the interstate commerce clause can be stretched to cover a multitude of sins against public health and that "general welfare" may be interpreted as broadly as the spirit of any given time may permit, but neither one of these alone nor both together are as yet accepted by either public opinion or the courts as warrant for federal control over state and local health-protective work. Moreover, it is interesting to note that such health-protective work for the control of specific outbreaks of disease as has been done by our federal government has generally if not always been in coöperation with local rather than state authorities. This fact is mentioned to illustrate how far we yet are from a public-health administration centered in and controlled by the federal government and reaching down through the state to the local governments.

The latter remarks on federal health activities have been made because throughout all the recent campaign for a federal bureau or department of health scarcely anyone seems to have given careful thought to the relationship which should be established between the federal, state and local health services.

Coming now to the states, most of these have at least a nominal board of health; many are doing a large amount of valuable health-protective work; a few are doing all that can be expected in the present state of public opinion and ignorance of health matters. Not a single state, so far as I know, has made a complete public-health survey of its whole area, worked out a program to meet present and prospective needs, and provided ways and means for carrying out the program.

While the sovereign states of the Union have ample power to bring local boards of health under the supervisory control of the state departments of health, or in most if not in all instances to substitute state for local control of health matters, there are but few states which have gone far in attempting to correlate the work of state and local boards. The state boards, instead of holding local boards up to a high standard, step in on appeal or of their own volition and perform duties which the local boards have neglected or have found beyond their capacity.

The country over, many cities and towns have a health board or department in name only and even where fairly well-manned and equipped local health departments exist, the work done from year to year covers only a part of the health field, and frequently spreads in haphazard fashion over other municipal provinces—such as the street or building departments.

Much of the health work which is done under such conditions has been taken up by chance, or at least has been prompted by the sanitary vagaries of past decades. Anything approaching a thorough sanitary survey, along modern lines, has never been more than dreamed of in a majority of the cities of the country, while the cities that have made such a survey and marked out a comprehensive program for five or even two years to come are few and far between.

What is needed first of all, is an authoritative determination of what's what in public health work. Next there should be settled how this work is to be divided between the federal, state and local governments, including the extent of coöperation between the federal government on the one hand and the state and local governments on the other; and also the extent to which the state boards of health shall have control over local boards and, in such matters as public milk supplies, even perform administrative work hitherto done chiefly or wholly by local boards.

Having determined what lines of work are proper functions of health departments, and having relegated to other departments the classes of work which functionally belong to them and are now clogging health boards, and having divided health work between the federal, state and local governments so as to prevent overlapping, conflict of jurisdiction and general inefficiency, the various health-protective agencies of the country should begin comprehensive surveys, each in its own province. Such surveys would disclose health-protective needs, indicate their relative importance, the measures, money and men necessary to meet them, and the order in which they should be met. The latter point deserves emphasis, since for many years to come health-protective demands will so far outrun available public funds as to make imperative a wise choice between what should be done this year and what may be postponed for one or more years.

Before I close I wish to call attention to the fact that some of our state departments of health call upon a city to install expensive sewage treatment works, for instance, when the interests of health would be far more promoted by improving the local water-supply or providing for the sanitary supervision of the milk-supply. Both state and local health authorities should have an intimate knowledge of all local sanitary needs before singling out one as an object of heavy outlay.

Finally, I venture to submit here, with slight modifications, suggestions made two years ago before the National Municipal League, as follows:

(1) That for the present public-health-protective work should be directed more particularly to the suppression of communicable diseases and the reduction of infant mortality, and that in their direct administrative phases these are functions of our local boards of health.

(2) That the chief functions of state boards of health should be to hold local boards to their health-protective duties along the lines just stated

and also to hold other branches of the municipal government, as well as private corporations and individuals, to a proper fulfilment of their various sanitary duties.

(3) That an additional and highly important function of state health boards is to perform certain lines of sanitary inspection which if left to local boards would result in overlapping work and in actual conflict, or else would be left undone, meaning particularly the control of the purity of public water-supplies and milk-supplies.

(4) That beyond these things, the several states should do a large amount of research and educational work, besides always coming to the aid of the municipalities in emergencies.

(5) That the federal government, aside from measures to prevent invasion by disease from foreign countries, should have much the same relation to the states of the Union as should the several states to the municipalities within their respective limits; or in other words should serve as a sanitary police in interstate matters, carry on research and educational work of national or at least large sectional interest, and come to the aid of states and cities in the case of emergenices.

These suggestions are submitted as a basis for what might be termed preliminary surveys of the health-protective field and of its several divisions. If followed, they would at least serve to point out what is being done and what is left undone; how the work of the different branches of government overlaps in certain areas and leaves other and perhaps wide territories uncovered; and how much is being attempted in the name of public health which really belongs to public cleansing, public comfort or public convenience and could be done more efficiently and economically by other departments of government.

A UNIQUE ORGANIZATION OF MILK DEALERS.

Frederic D. Bell,
Lederle Laboratories, New York.

Read before the American Public Health Association, Washington, D.C., September, 1912.

The City of New York has now attained a population of over 5,000,000 human beings. Daily there flows into the city something over 2,500,000 quarts of milk and cream. This supply comes from seven states and from distances as far away as the eastern part of the State of Ohio. Between 40,000 and 50,000 dairy farms contribute to this enormous body of milk and cream. Practically the entire supply is distributed by dealers who have no ownership or direct control over the dairy farms producing the milk.

It was realized by these milk dealers that to protect themselves as between the farmer or producer and the New York City authorities having control of the sanitary aspects of the milk supply it would be extremely desirable to have an organization—for "In union there is strength"—where they could discuss the sanitary problems involved and mutually help each other in their solution.

For a number of years these same dealers have been organized in an insurance society for the purpose of insuring their creameries and other buildings. They had also had an organization for the purpose of collecting and redistributing lost bottles and cans. The peculiar conditions existing in New York City, with its tenement and flat houses, made such an organization absolutely essential. It was not, however, until 1905 that any serious attempt had been made to organize for the purpose of working out together the sanitary problems involved in the care and distribution of milk. About that time an organization was completed, known as the Association for the Improvement of the Milk Supply of New York. Some fifty-five dealers in Greater New York joined this organization. They met monthly with greater or less regularity and discussed subjects that were pertinent to their business, particularly any new sanitary regulations which may have been promulgated by the local or state authorities. Eminent scientists were occasionally asked to address these meetings. Interest in this organization began to lag within three years after the organization, and finally it practically died a natural death.

Early in 1910 some of the larger dealers who had been interested in the defunct organization, finding that such coöperation was almost essential, got together and revived the association under the name of The New York

Sanitary Milk Dealers Association. In this organized body were to be found most of those who had been in the older organization, and some that had not. The total membership is now about forty. Certain defects in the original association were carefully avoided in the new. Each member was required to subscribe to the Constitution and By-Laws of the association, and particularly to three clauses, which it may be of interest to read at this point:

If elected a member, I agree to coöperate with the other members in seeking to accomplish the objects of the Association as outlined in Article II of the Constitution and to comply with Articles XI and XII of the Constitution.

ARTICLE II.

The objects of the Association shall be as follows:

First: The improvement of the milk supply:

(A) Through the coöperation of the members of the Association in adopting advanced scientific methods and machinery to be used in the handling or distribution of the product, so as to produce a more wholesome supply;

(B) Through the enactment and adoption of uniform and improved rules and regulations to be observed by the members, covering the sanitary and other allied conditions, so far as the members of the Association may be able to control or influence the same, of farms and dairies where milk is produced or of creameries and shipping stations, covering conditions and methods in the transportation of milk and allied products and the handling of the same;

(C) Through experiments and investigations and bacteriological analyses to be conducted by scientific experts to be employed by the Association, and the dissemination of the information so obtained among the members of the Association;

(D) By the exchange among the members of ideas and the results of experience.

Second: To improve the conditions under which the business of buying, selling and dealing in milk and its allied products shall be carried on through coöperation with the Department of Health and other state or local officials in forwarding appropriate legislation or sanitary regulations or sanitary ordinances and in opposing legislation or regulations inimical to the proper conduct of such business.

Third: To coöperate with other societies or bodies having similar objects in obtaining such desired results.

Nothing herein contained shall include any regulation regarding either the price for which milk or allied products shall be bought by the members nor the price at which the same may be sold, nor shall any regulations be adopted by the Association having such objects in view.

ARTICLE XI.

Members agree as a condition of membership to comply with the state and municipal laws and regulations and to observe all sanitary measures promulgated by controlling authorities.

ARTICLE XII.

Section 1. Members agree to give access to authorized representatives of the Association, delegated by its Board of Trustees or an Executive Committee of such Board, to make inspections of their plants and equipments, or conduct investigations as to their methods of carrying on their business, including the taking of samples for analysis to determine whether or not members are complying with the obligations assumed, as outlined in Article XI.

Sect. 2. The work of inspection and investigation shall be delegated to the Consultants and Analysts of the Association, who shall make a report in writing of their findings in the Executive Committee.

To properly carry on the business of the Association as outlined in the above Articles, there is elected a board of Trustees of fifteen members, and from this Board an Executive Committee of six is appointed. In addition to the Executive Committee there are five other committees. These are: the Membership Committee, the Finance Committee, the Auditing Committee, the Sanitary Committee, and the Law Committee. Briefly, the duties of these committees are as follows:

The Membership Committee passes on applications for membership and, where thought desirable, make plans to increase the membership.

The Finance Committee considers plans for the raising of funds, which is done on an assessment basis, an annual charge being made on each wholesale and retail wagon operated by the members of the Association. It was in this way that the larger dealers who were better able were required to pay a larger share of the expenses of the organization.

The Auditing Committee audits the bills and accounts of the Treasurer.

The Sanitary Committee considers the sanitary problems surrounding the production of milk at the dairy farms, the transportation to the creameries, the handling at these points, the reshipment to the city, the pasteurizing and bottling, the washing of utensils and containers, the storage and delivery and all other problems of a sanitary nature.

The Law Committee considers and reports upon such sanitary ordinances as may be adopted by the local authorities or such laws as may be proposed or passed by the state legislature. It also considers such legislation as may be desired by the membership for the purpose of improving the conditions surrounding the business.

Meetings of the Association are held monthly, and sometimes more frequently, if circumstances demand.

So far as the writer knows, this is the first organization of milk dealers attempting to improve the sanitary conditions surrounding the milk business. In order that it may be clear that such an endeavor is actually being made, it may be of interest to know, very briefly, some of the things which the organization has done since its reincarnation in 1910.

Perhaps the most interesting and spectacular thing which the organization has done has been the issuance of its educational leaflets.* So far, three of these have been issued. The first, known as "The Care of Milk in the Home," was prepared for the purpose of instructing the consumers as to their duties in the matter of the handling and care of milk. It is rather an interesting coincidence to note that while this circular was being prepared, a similar circular was being written by the Department of Agriculture in Washington and by the department presided over by the food commissioner of the State of Illinois. Later we learned of a similar leaflet, although not quite so comprehensive or specific, which had been prepared by a Doctor E. C. Levy, the health officer of Richmond, Virginia. The publication of this leaflet was commended very generally the country over and it was reprinted in several State Health Department *Bulletins* and other periodicals. Women's organizations at various times demanded large numbers for distribution among their members, and the Association felt very well repaid for the effort and expense involved. It is naturally very difficult to estimate the exact effect that such a publication may have upon the consumers in so large a city as New York. The effort, however, was so encouraging that somewhat later the Association published the second of the series, known as "The Care of Milk in the Store." Conditions surrounding the sale and distribution of milk from grocery stores, delicatessen shops and the like in the City of New York were far from being satisfactory, either to the health authorities or to the dealers themselves. It was hoped that the publication and distribution of this circular would help to explain the wise regulations which the Health Department had made and which it had been unable very largely to enforce. The Association believes that the distribution of this circular supplemented to a large and profitable extent the excellent work of the local authorities and other organizations aiming to bring about the same good ends. This circular also received favorable comment and has had a wide circulation.

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* Copies of these will gladly be sent to any interested reader.

The third of the series has only just been published. It aims to give some simple directions to the farmer regarding the sanitary condition surrounding the production of milk and to explain the requirements which have been made by the New York City Board of Health and by the state authorities, and which have been so irksome to such a large number of producers. None of these circulars are aimed to be exhaustive memoranda on their respective subjects. Least of all is this the case, perhaps, with this third circular. Nevertheless, the Association believes that there is sufficient information conveyed so that if the instructions are followed, a very material help to the progress of the cause of clean milk will have been given.

A brief résumé of the subjects discussed at the monthly meetings may be of interest. One of the first of these subjects to command the attention of the Association was the proposed ordinance for hermetically sealing milk bottles containing pasteurized milk. A great deal of time and money was spent in the investigation of so-called devices for effecting a perfect seal, and finally the regulation was withdrawn by the local board of health.

A bill for the regulation of the capacity of milk bottles and cans was very carefully considered by the Association, and certain modifications of the bill were suggested through the Law Committee of the Association to those having it in charge in the state legislature.

The requirements for the pasteurization of milk were very thoroughly discussed on several occasions. Conferences were held with the local health commissioner on this subject and certain modifications making the regulations practical were obtained.

The question of the transportation of the milk under proper refrigeration conditions was vigorously taken up by the Association with the milk agents of the various railroads transporting milk to this city. A decided improvement in the manner in wich the cars are iced and in the temperatures of the milk on receipt in New York City was obtained as a result of this campaign.

The question of the possible prohibition of the sale of so-called "loose milk" to be dipped from cans in grocery and other stores was being seriously considered by the local board of health. Several meetings to discuss this problem were held by the Association. Finally a resolution, of which the following is a copy, was adopted:

> *Resolved*, That it is the sense of this meeting of the New York Sanitary Milk Dealers Association that the rescinding of all permits for the sale of loose or dipped milk from grocery or delicatessen stores would in our judgment be a great mistake; and be it *further resolved* that we approve of such action on the part of the Department of Health looking to the sanitary regulation of such stores as will make them proper places for the sale of loose or dipped milk, and that we approve of the cancellation of permits to such stores as do not satisfactorily comply with the proper sanitary regulations of the Department of Health.

The question as to whether or not milk bottles and cans should be cleaned before they were returned to the country creameries was discussed with great fervor at several of the meetings. The New York City Sanitary Code requires that—

> It shall be the duty of all persons having in their possession bottles, cans or other receptacles containing milk or cream which are used in the transportation and delivery of milk or cream to clean or cause them to be cleaned immediately upon emptying. No person shall use or cause or allow to be used any receptacle used in the transportation and delivery of milk or cream for any purpose whatsoever other than the holding of milk or cream; nor shall any person receive or have in his possession any such receptacle which has not been washed after holding milk or cream or which is unclean in any way.

This section of the Sanitary Code, it is believed by the milk dealers, is unjust. Not that they are unwilling to clean their milk bottles and cans, but they believe that the ordinance should be enforced on the consumer and not on the dealer. As it now stands, if a dealer takes up a dirty can or a dirty bottle which the consumer has failed to clean, he is liable to arrest. This matter was very carefully considered and a long memorandum prepared and sent to the Department of Health indicating the attitude of the dealers toward this matter. Legislation on this subject proposed at Albany was carefully discussed and a committee of the Association appointed to appear at the hearings and present the views of the New York dealers.

At one of the regular monthly meetings there was a demonstration of the proper use of the Babcock machine for the determination of the butterfat content of milk and cream. At this meeting the dealers had present their creamery foremen, who operate these machines at the creameries,. The various pitfalls into which the inexperienced man is likely to drop were carefully pointed out, and the dealers were urged to have these tests made regularly for their own self-protection.

At another meeting the commissioner of agriculture of the State Department of Agriculture appeared and discussed the state laws with reference to milk and its products.

On still another occasion certain suggestions were discussed for the improving of conditions surrounding the production of milk at the dairy farms. It was decided to impress upon the farmers the desirability of using a small-mouth milk pail. Other practical suggestions of this kind were considered and the dealers urged to promulgate the suggestions amongst their dairy patrons.

At one of the meetings consideration was given to the question of the growth of bacteria in milk at different temperatures and under different conditions. It was interesting to observe how keenly the dealers listened to this discussion and how much they had learned of the bacteriology of milk since the organization of the Association, and how intelligently they were able to discuss the questions presented.

It was very early discovered after the organization of the Association that the milk dealers could be interested in these sanitary problems, if for no other reason, from a selfish motive. Hundreds of thousands of cans of milk formerly shipped to this city were lost because of souring, due to the improper care of the milk either at the farm, the creamery, or in transit. This meant thousand of dollars of loss to the dealers, and when the reasons for this loss were clearly understood, the dealers were only too willing to take such steps as they could to improve the conditions and prevent this drain on their profits; not that they were unwilling to take these steps because of their interest in improving the supply outside of the selfish interest of the stoppage of waste. Practically all of the dealers were anxious to obtain and to serve a high grade of safe milk, especially where it was to be used for infant feeding.

In New York City the conditions surrounding the milk business, starting back at the dairy farms and following the supply to its final consumption, are today fully 100 per cent. better than they were ten years ago. We believe that the work of this Association is responsible to a very considerable extent in this improvement. It is confidently expected that this good work will be continued and that the efforts of the Association and its individual members in the future will bear even greater fruit than has been the case in the past. There is no question but what the influence of the dealer with the farmer who supplies him with his milk is greater than the more or less arbitrary authority of the city inspectors who in very many instances are none too well posted with regard to their duties and who, to say the least, are not always diplomatic. There has been roused in the past a very strong and stubborn resistance on the part of the farmers to the Health Department regulations. When these regulations have been explained in a diplomatic way by the dealers or their representatives there has practically always developed a willingness on the part of the dairy farmer to do anything reasonable within his power to improve his conditions.

The institution of similar organizations in the larger cities of the country would be a very powerful influence for the bringing about of the more or less ideal conditions under which milk should be produced and sold.

SANITARY IMPROVEMENT IN CUBA AS DEMONSTRATED BY STATISTICAL DATA.

JORGE LE-ROY Y. CASSÁ, M. D.
Habana, Cuba.

The health of the people being the supreme law everything that contributes to it serves both science and humanity. There is no more positive lesson, therefore, of so beneficial results than that which shows, in an evident manner, the benefits obtained in the preservation of life and the prevention of diseases.

As these meetings should be of a practical nature, I have decided to present before you, in numerical form, the results achieved by our sanitary campaign. The fight against preventable diseases, diminishing the death rate for the whole country, and wiping away from the obituary tables several diseases, such as smallpox and yellow fever, which decimated until recently our population; the colossal victory just gained against bubonic plague, surprising the latter before it could invade us in an alarming form, speaks very highly for our sanitary organization. These figures also serve to demonstrate that the old notions about the unhealthiness of tropical climates, though refuted many years ago by our great Doctor Finlay, were erroneous and founded on a false traditional belief, as proved by the facts when the hygienic measures advised by our scientific men were energetically applied.

Likewise those same figures serve us in making evident other evils which we should avoid, endeavoring with all our resources to eliminate the causes which originated then and to make known to all, that in order to do sanitation everything that opposes the compliance of hygienic precepts should be done away with.

In regards to the mortality for the whole country I can not present figures prior to 1900, because the documents consulted by me previous to that year do not include all the island, having reference only to isolated localities and hence the true sanitary condition of the country cannot be ascertained. However, with the data for the last twelve years, it can be shown that there has been a marked decrease in the death rate:

The increase in the total number of deaths in the years 1906 and 1907 is due in great part to grippe, which began in 1906 and reached in the next year to 414, the highest figure recorded during the period of our investigation; infantile enteritis also in that year recorded the largest number of victims (5,952).

During that year of 1907, the American Intervening Government issued two decrees, Number 894 dated August 26, and Number 1187 dated November 22, by which all the sanitary services of the Republic of Cuba were nationalized and our land and marine sanitary organizations were united, the beneficial results of those measures were rapidly manifested by the remarkable decrease in the death coefficients in succeeding years, with the exception of that of 1910 which rose again to 15.21 per thousand. That rise was explained by me in the *Letter of Transmittal* to the Director of Sanitation in the following manner:

"The coefficient of mortality is represented by 15.21, and is somewhat higher than that of 1909 which was only 13.03. An investigation of the causes leading to this increase of 2.18 over the coefficient of the previous year led us, in the first place, to trace it to the increase of population, and above all to that of natality. As we all know, in countries where there is a high rate of natality there is a large mortality, for children furnish the greater number of deaths. In the second place, we ascribe the increase to the death-dealing influence of grippe, which continues to cause a disastrous havoc upon persons of weak constitution. For instance, if we examine the influence of grippe over those diseases upon which it is most directly manifested, by summing up the mortality brought about by grippe, tuberculosis, organic diseases of the heart and of the vessels, bronchitis, broncho-pneumonia, pulmonary congestion and pleurisy, we observe that there has been an increase of 2.165 deaths from this cause over those year before last; a figure which is equal to more than one third of the total number of deaths (37.95 per cent.). On the other hand, deaths produced by infantile diarrhœas, numbered 6.139 or an increase of 1.921 over those of the previous year and equal to one sixth (18.44 per cent.) of the total.

Years.	Estimated Population.	Total Num. of Deaths.	Death Rate.
1900	1.632,320	28.779	17.35
1901	1.691,834	27.754	16.34
1902	1.751,366	25.512	14.53
1903	1.810,889	23.982	13.20
1904	1.870,411	25.198	13.42
1905	1.929,934	27.345	14.16
1906	1.989,457	30.021	15.04
1907	2.048,980 (Census)	34.000	16.58
1908	2.141,322	28.361	13.17
1909	2.213,299	28.832	13.03
1910	2.220,278	33.844	15.21
1911	2.297,134	32.065	13.96

Adding these two causes of disease, we find that they represent more than one half (56.09 per cent.) of the total of the mortality occurring in the Republic for the year."[1]

SMALLPOX. The disappearance of smallpox since July 1900, is one of the greatest victories achieved by the Sanitary Department, both during the first American government of intervention as well as during our own government; since that date, the only case registered, was that of an employee of Las Animas Hospital, who became infected some time in June, 1901, from a serious case of one of the immigrants from St. Nazaire (France). The employee had been recently appointed and had managed to elude the vaccination which is required of all employees at that institution whenever a case of smallpox is admitted to the hospital, and death was the penalty for the transgression. The revaccination of all the staff, the isolation and disinfection succeeded in avoiding an outbreak and also served to show the efficacy of these measures.

In order that the importance of this victory may be easily appreciated, I reproduce herewith the table of deaths from smallpox which have occurred in Habana since the year 1870.

DEATHS FROM SMALLPOX IN HABANA.

Years.	Total Number of Deaths.	Years.	Total Number of Deaths.
1870	681	1891	151
1871	1126	1892	0
1872	174	1893	8
1873	47	1894	216
1874	772	1895	181
1875	711	1896	1004
1876	160	1897	1404
1877	97	1898	168
1878	1225	1899	4
1879	523	1900	2
1880	446	1901	0
1881	706	1902	0
1882	1	1903	0
1883	5	1904	1
1884	1	1905	0
1885	0	1906	0
1886	0	1907	0
1887	1654	1908	0
1888	550	1909	0
1889	7	1910	0
1890	12	1911	0

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[1] *Sanidad y Beneficencia*, Habana, 1911, t. VI.

From the study of the above figures it may be learned that this disease, which almost never disappeared from our obituary tables, reached proportions truly alarming in the epidemics of 1870–72 (1981 deaths), 1874–76 (1643 deaths), 1878–81 (3,000 deaths), 1887–88 (2,104 deaths) and in 1896–98 (2,576 deaths) which was the last one we had in Cuba.

YELLOW FEVER. While the smallpox infection was terrible in its effects, yet it could be avoided by the simple process of Jenner's vaccine; on the other hand, yellow fever attacked all who lived upon our soil, playing havoc among the foreigners, who were not always willing to risk their lives and therefore contributed in great part to our scanty immigration. Since 1761 yellow fever became permanent with us, being imported by the convicts from Vera Cruz (Mexico) when at the request of Governor Prado they were brought to Cuba, to work in building the defenses of Habana, foreseeing the war with England, which culminated in 1762 with the fall of the city to the English. Before that time, however, in 1741, yellow fever was imported by the English fleet under Vernon, which arrived at Guantanamo, in the southern coast of Cuba. In 1649 there existed the disease, becoming epidemic until 1655 and probably also in 1620, when it was called the Habana Epidemic and which spread later to the French West Indies.

From 1761 to 1901, it can be asserted that every year there were victims of the disease as proved by the documents gathered by the American Yellow Fever Commission presided over by the late Dr. S. E. Chaille in 1879.

In the table on page 259, which includes a period of over half a century, the truth of the above assertion can be clearly noticed:

From September 28, 1901, until the same month in 1905 we had defended ourselves against this disease, in spite of continuous importation of cases from different seaports on the Gulf of Mexico; but in the year 1905 a serious epidemic of yellow fever made its appearance in Louisiana and West Florida and from there it was introduced again into Cuba causing, until December 24, 1908, 359 cases of which 127 died. This last importation of yellow fever into our country, besides the positive lessons pointed out by Doctor Guiteras in his *Notes on yellow fever and tuberculosis in Cuba during the last years*, serves also to prove that with reference to hygiene and sanitary vigilance the ties which bind the measures recommended by science in their practical application, should never be relaxed.

MALARIA. Another of the infections which contributed to raise the deathrate coefficient of our statistics was malaria, a disease against which our sanitary organization has won a great victory. If the figures representing the number of deaths caused by malaria were examined, we will find that in 1900 there were 4,107 deaths and it has gradually decreased to 526 in 1911, representing a reduction of 12 per cent. between the two years under comparison; the figures are still more flattering if the remarkable increase of population is reckoned with, also the important works carried on by railway and sugar companies, in the country exposing the laborers to anopheles infection.

DEATHS FROM YELLOW-FEVER IN HABANA SINCE 1856.

Years.	Number of Deaths.	Years.	Number of Deaths.
1856	1309	1884	511
1857	2058	1885	165
1858	1396	1886	167
1859	1193	1887	532
1860	439	1888	468
1861	1020	1889	303
1862	1386	1890	308
1863	550	1891	356
1864	555	1892	357
1865	238	1893	496
1866	51	1894	382
1867	591	1895	5553
1868	290	1896	1282
1869	1000	1897	858
1870	572	1898	136
1871	991	1899	103
1872	515	1900	310
1873	1244	1901	18
1874	1425	1902	0
1875	1001	1903	0
1876	1619	1904	0
1877	1374	1905	22
1878	1559	1906	12
1879	1444	1907	5
1880	645	1908	1
1881	485	1909	0
1882	729	1910	0
1883	849	1911	0

In the following tables, I give the absolute and relative number of deaths caused by malaria in Habana since 1871 and in the Republic during the last twelve years. They speak for themselves, better than all comments that could be made.

I could continue the analysis in the course of every one of the diseases mentioned in Tables I and II, but not only would it be a useless repetition, but also extend this paper considerably. However, the decrease noticed in nearly all the avoidable diseases should be mentioned, particularly dysentery, typhoid fever, tetanus and even tuberculosis.

DEATHS FROM MALARIA.

HABANA.						REPUBLIC.		
Years.	Total of Deaths.	Death Rate.	Years.	Total of Deaths.	Death Rate.	Years.	Total of Deaths.	Death Rate.
1871	262	1.33	1891	292	1.37			
1872	316	1.60	1892	286	1.33			
1873	329	1.61	1893	246	1.12			
1874	288	1.45	1894	201	0.90			
1875	284	1.43	1895	206	0.90			
1876	334	1.68	1896	450	1.95			
1877	422	2.12	1897	811	3.48			
1878	453	2.28	1898	1907	8.00			
1879	343	1.72	1899	909	3.76			
1880	384	1.93	1900	325	1.30	1900	4,107	2.51
1881	251	1.26	1901	151	0.55	1901	3,286	1.94
1882	223	1.12	1902	77	0.29	1902	1,546	0.87
1883	183	0.91	1903	51	0.19	1903	1,204	0.66
1884	196	0.98	1904	44	0.16	1904	1,079	0.57
1885	101	0.50	1905	32	0.11	1905	1,100	0.56
1886	135	0.67	1906	26	0.08	1906	1,147	0.57
1887	269	1.34	1907	23	0.08	1907	925	0.45
1888	208	0.99	1908	19	0.06	1908	730	0.34
1889	228	1.11	1909	6	0.01	1909	745	0.33
1890	256	1.23	1910	15	0.05	1910	622	0.28
			1911	12	0.03	1911	526	0.22

Attention should be called to the small epidemic outbreaks of scarlet fever, measles, whooping cough, diphtheria and grippe which invaded certain localities and thus increased temporarily the number of deaths from each of those diseases.

As to infantile enteritis, the factors which contribute to it are so complex and the causes are so multiple, that for the present I shall abstain from making any comments that the figures suggest. The only thing that should be considered is that our sanitary authorities have already taken measures as to the milk supplies for our infants, that dispensaries and other institutions have begun the maternal education in order to overcome popular errors and ignorance in regard to infant feeding.

All the above statements are truly flattering, yet it is at least alarming, the continuous progress revealed by the cancer death rate. The ascending curve which expresses the increase of that disease, the deaths of which have more than doubled, compel us to insist before all that those who devote themselves to the study of this disease, investigate the causes in order to combat the effects.

TABLE NUMBER I.

Total deaths and death rate per 1,000 of population. Republic of Cuba.

	1900.		1901.		1902.		1903.		1904.		1905.		1906.		1907.		1908.		1909.		1910.		1911.	
	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.
Typhoid fever	563	0.34	511	0.30	362	0.20	342	0.18	296	0.15	310	0.16	264	0.13	348	0.16	314	0.14	253	0.11	277	0.12	365	0.15
Measles	?		?		3	0.001	0	0.00	32	0.01	184	0.09	172	0.08	115	0.05	62	0.02	113	0.05	83	0.03	99	0.04
Scarlet fever	?		?		15	0.008	126	0.06	90	0.04	63	0.03	61	0.03	30	0.01	48	0.02	21	0.009	19	0.008	21	0.009
Whooping cough	?		?		12	0.006	90	0.04	101	0.05	92	0.04	159	0.07	135	0.06	212	0.09	147	0.06	201	0.09	116	0.05
Diphtheria and croup	84	0.05	97	0.05	103	0.05	113	0.06	136	0.07	137	0.07	199	0.10	194	0.09	195	0.09	214	0.09	161	0.07	167	0.07
Influenza	?		?		163	0.09	109	0.06	158	0.08	231	0.11	176	0.08	414	0.20	232	0.10	311	0.14	545	0.24	399	0.17
Dysentery	242	0.14	189	0.11	152	0.08	85	0.04	51	0.02	64	0.03	72	0.03	79	0.03	33	0.01	35	0.01	43	0.01	55	0.02
Leprosy	?		?		18	0.01	31	0.01	15	0.008	29	0.01	39	0.01	47	0.02	30	0.01	25	0.01	35	0.01	53	0.02
Erysipelas	?		?		35	0.01	35	0.01	27	0.01	38	0.01	37	0.01	38	0.01	47	0.02	45	0.02	34	0.01	38	0.02
Glanders	14	0.08	17	0.01	9	0.005	2	0.001	1	0.0005	1	0.0005	2	0.001	1	0.0004	1	0.0004	6	0.002	0	0.00	0	0.00
Anthrax	?		?		21	0.01	23	0.01	11	0.005	16	0.008	12	0.006	11	0.005	16	0.007	15	0.006	10	0.004	13	0.005
Rabies	?		?		0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	0.0004	7	0.0004	5	0.0003	9	0.0002
Tetanus	1,672	1.02	1,661	0.98	1,602	0.91	1,344	0.74	1,269	0.67	1,349	0.69	1,192	0.59	1,012	0.49	982	0.46	896	0.40	742	0.33	764	0.33
Tuberculosis	4,068	2.48	4,048	2.29	4,020	2.28	3,880	2.14	3,958	2.11	4,101	2.12	4,092	2.05	4,189	2.04	3,538	1.66	3,246	1.47	3,287	1.48	3,419	1.49
Cancer	428	0.26	503	0.29	539	0.30	601	0.33	661	0.35	746	0.38	808	0.40	813	0.39	901	0.42	981	0.44	1,004	0.45	977	0.42
Simple meningitis	1,088	0.65	1,344	0.79	1,228	0.69	1,165	0.64	1,262	0.67	968	0.50	931	0.46	1,197	0.58	773	0.36	989	0.44	1,033	0.46	797	0.34
Diarrhœa and enteritis (under 2 years)	3,177	1.95	3,801	2.25	2,264	1.29	1,920	1.06	2,373	1.27	3,279	1.69	3,659	1.84	5,952	2.90	4,224	1.97	4,218	1.90	6,139	2.77	5,724	2.49
Puerperal septichæmia	194	0.12	176	0.10	157	0.09	144	0.08	120	0.06	138	0 07	189	0.09	144	0.07	118	0.06	172	0.08	145	0.07	164	0.07

TABLE NUMBER II.

Total deaths and death rate per 1,000 of population. Municipal District of Habana.

	1900.		1901.		1902.		1903.		1904.		1905.		1906.		1907.		1908.		1909.		1910.		1911.	
	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.
Typhoid fever	90	0.36	83	0.32	87	0.33	85	0.31	73	0.26	88	0.30	54	0.19	100	0.33	66	0.21	52	0.16	65	0.21	105	0.31
Measles	4	0.02	4	0.01	4	0.01	9	0.03	25	0.08	73	0.25	16	0.05	33	0.10	13	0.04	51	0.16	6	0.02	21	0.06
Scarlet fever	3	0.01	4	0.01	11	0.04	117	0.42	49	0.17	13	0.04	2	0.003	4	0.01	8	0.03	4	0.01	4	0.01	6	0.02
Whooping cough	?		4	0.01	3	0.01	10	0.04	6	0.02	2	0.007	5	0.01	28	0.09	14	0.04	3	0.009	7	0.02	21	0.06
Diphtheria and croup	15	0.06	25	0.09	25	0.09	26	0.09	21	0.07	28	0.13	37	0.12	56	0.19	27	0.09	30	0.09	29	0.10	21	0.06
Influenza	64	0.26	24	0.09	53	0.20	26	0.09	32	0.11	67	0.23	53	0.17	101	0.33	69	0.22	89	0.28	123	0.40	79	0.24
Dysentery	20	0.08	11	0.04	3	0.01	7	0.02	4	0.01	1	0.003	1	0.003	3	0.01	0	0.00	0	0.00	2	0.007	2	0.006
Leprosy	?		7	0.03	12	0.04	13	0.05	9	0.03	16	0.06	25	0.08	31	0.10	14	0.04	10	0.03	13	0.04	31	0.09
Erysipelas	12	0.05	4	0.01	13	0.04	6	0.02	6	0.02	6	0.02	8	0.03	5	0.02	6	0.02	3	0.009	6	0.02	3	0.009
Glanders	10	0.04	11	0.04	5	0.02	2	0.007	1	0.003	1	0.003	0	0.00	1	0.003	0	0.00	2	0.006	0	0.00	0	0.00
Rabies	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	0.003	6	0.02	0	0.00	3	0.009
Tetanus	185	0.74	148	0.58	97	0.37	54	0.20	52	0.19	43	0.15	45	0.15	46	0.15	43	0.14	33	0.10	22	0.07	29	0.08
Tuberculosis	856	3.43	811	3.15	959	3.62	1,037	3.80	1,161	4.15	11,79	4.17	1,158	3.93	1,176	3.89	1,185	3.80	993	3.11	1,046	3.40	1,115	3.33
Cancer	140	0.56	171	0.66	176	0.66	213	0.78	210	0.75	232	0.77	258	0.90	269	0.89	318	1.02	344	1.08	338	1.10	340	1.01
Simple meningitis	395	1.58	273	1.06	162	0.61	389	1.43	393	1.40	288	1.00	286	0.97	352	1.16	177	0.57	313	0.98	286	0.94	242	0.72
Diarrhœa and enteritis (under 2 years)	212	0.85	742	2.89	469	1.77	250	0.92	399	1.43	468	1.63	451	1.53	610	2.01	556	1.78	577	1.81	724	2.38	723	2.13
Puerperal septichæmia	15	0.06	13	0.05	23	0.09	21	0.07	25	0.08	17	0.05	16	0.105	14	0.05	14	0.04	20	0.06	13	0.04	22	0.07

ANNUAL REPORT ON THE CONDITION OF YELLOW FEVER THROUGHOUT THE MEXICAN REPUBLIC.

Dr. Eduardo Liceaga,
Mexico City, Mexico.

Read before the American Public Health Association, Washington, D. C., September, 1912.

In the report which I had the honor to present to this Association at the meeting held in Havana, the reports on yellow fever reached up to the 25th of November, 1911, from which date I have to bring up my report on what has passed in the Republic to the last day of August of the present year.

The measures adopted to suppress the new focii were as follows:

When the yellow fever broke out in Mérida it was found that the focus was limited to the barracks which were occupied by the 16th and 31st Battalions and the "Rosado Peraza," A domiciliary visit was made to the persons lodged in those barracks, as well as to all who frequented them, taking their temperature twice every day, in order to discover any individual who might be suffering from fever and immediately isolate him in the Lazarrette. In this building all the necessary repairs were executed to adapt it to its purpose, and the Board of Diagnosis was commissioned to investigate every case. All the premises in which sick persons or others suspected of yellow fever lived, were duly disinfected and the struggle was actively continued against the larvæ of the mosquitoes, visiting the water cisterns throughout the town, emptying those which were found uncovered and spreading oil over those which could not be covered; besides which a very active supervision was maintained over all non-immunes outside of the focii above mentioned.

Since the 23d of November, sixteen cases of yellow fever were observed in Mérida, with six deaths; two in Motul with one death, one fatal case in Tamax, one in Espita which recovered, one in Maxcanu without a death, seven (?) in Kambul with seven deaths, giving a total in the State of Yucatán of fifty-three cases, the last one of which was observed on the 1st of May of the present year. Of all these cases, reports were constantly made to the sanitary authorities of the United States and Cuba. As you will see, the epidemic in the State of Yucatán has terminated.

On the 25th of May last, the sanitary delegate in Coatzacoalcos reported a case which was suspected of being yellow fever, and which was confirmed. It was found that the patient had gone from San Juan Bautista in Tabasco to the Port of Frontera. The necessary investigations were made and it was then discovered that there had been five cases in San Juan Bautista, which the local sanitary authorities had not reported.

As soon as this was known, those authorities were pressed to display the greatest possible activity in the campaign against yellow fever, and offers made to impart the assistance of the federal government. This was at first courteously refused, but was eventually accepted in view of the spread of the epidemic, and then a Federal Sanitary Brigade was sent and commenced a systematic struggle against the disease. The cases at first succeeded each other with some frequency, but gradually disappeared with the result that during the epidemic there were fifty cases with twenty-two deaths, from the 1st of May to the 19th of August of this year. The last case observed was on the 19th of August, and up to the date on which this report was closed, we can consider as extinguished the focus of yellow fever which had appeared in San Juan Bautista.

A battalion which was in garrison in San Juan Bautista, proceeded to Frontera on board the S. S. *Walkyrian*, and on reaching that port was isolated. Two cases of yellow fever were observed amongst the crew of that steamer, one of whom was the chief officer and the other a sailor, the former with a fatal termination. The men were properly isolated and the entire crew were taken ashore to a place where they could be kept under observation, after which the steamer was fumigated and domiciliary visits were made both to the members of the crew as well as of the 39th Battalion. No fresh case appeared either in the city, in the battalion or in the crew up to the date on which I close this report. The diagram which I present shows at first sight the progress of the epidemic in Mérida and surrounding towns, as well as in San Juan Bautista, and the isolated cases which have appeared in Frontera and the sole case imported from Frontera to Coatzacoalcos.

But what I desire to show is, that if the circumstances now prevailing in the Mexican Republic have permitted the development of the two foci of which I have made mention, it is to be expected that, with the new plan of campaign which we are putting in practice, we will be able to finally extinguish this disease.

Mexico, 29th August, 1912.

AN ESTIMATION OF THE DAILY SOOT DEPOSIT IN INDIANAPOLIS.

H. E. Barnard and William D. McAbee.
State Board of Health of Indiana.

Of the many arguments favoring the abatement of the smoke nuisance› the most effective is, that showing the economical waste due to the non-utilization of a considerable quantity of the fuel shoveled into the grate. To the sanitarian there are other more weighty arguments. The continual inhalation of air befouled with ash and carbon cannot but produce definite results upon the respiratory organs that are certainly not beneficial and in all probability favorable to pathological change. This injury cannot be definitely established in terms of dollars and cents.

The soot and dust nuisance is directly and indirectly expensive because of the damage done to various materials. Soot deposits make house painting and finishing necessary far more frequently than if the air were clean; the cleansing of draperies becomes necessary at frequent intervals, and all laundry bills are increased greatly because of the condition of the atmosphere of the average manufacturing city.

Indianapolis is not different from other cities in this respect. Because of the fact that large quantities of soft coal are consumed and the city ordinances regulating the smoke nuisance are not effectively enforced, it is perhaps less clean than even larger cities where hard coal containing less volatile matter is used, or where fuel combustion is more carefully regulated.

In order to determine if possible the amount of soot deposited daily under ordinary working conditions, advantage was taken of a snowfall in the month of March to collect samples of snow which were later analyzed for their organic and mineral content. The snowfall which began at 10 p. m. March 2 and continued until 12 m. March 3 was followed by very cloudy weather. The record of the U. S. Weather Bureau shows the average velocity of the wind to have been about nine miles an hour and the prevailing direction northeast. The samples of snow were taken on Monday, March 4, between the hours of 12 m. and 3 p. m. The analytical results obtained show the deposit from the atmosphere during a period of twenty-four hours. Unfortunately, a large part of this time included Sunday afternoon and night when manufacturing operations were suspended and at a time while railroad traffic was much less than during a week day. For this reason the results obtained do not show conditions as bad as those of the average twenty-four hours.

The samples were taken at each street intersection within a radius of one-half mile from the center of the city and included that area known as the "mile square." Samples were also taken in residential parts of the city, at the city hospital, near Fall Creek and in Irvington. Each sample included a square foot of surface. The snow from this measured area was carefully scraped together and placed in a numbered bottle. The snow, with its burden of soot and ash was melted and the insoluble content determined by filtering through a tarred Gooch crucible. The results obtained are shown graphically on the accompanying chart. The black dots represent one pound of organic and mineral matter per acre per day. The average deposition during the twenty-four hours under examination was 10.28 pounds per day in the district included in the "mile square." Presuming a similar deposition during the three hundred and sixty-five days in a year, the total amount of coal and ash deposited on that territory is 1,200.7 tons per annum. As a matter of fact, the deposition is no doubt greater than this, for as before indicated the observation includes only a part of a day in which business operations were in motion.

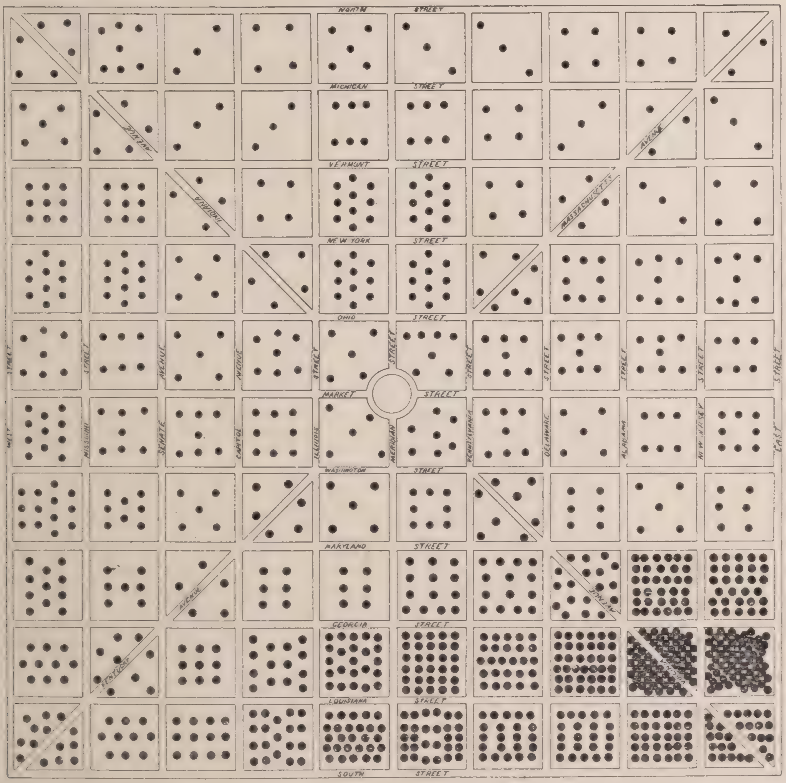
An analysis of the material deposited showed a volatile carbon content of 17.2 per cent. and an ash content of 56.96 per cent. The British thermal units or calorimetric value of the deposited material was 3,944. As compared with an ordinary soft coal, the material was very low in fuel value, consisting largely of ash. The ash content is interesting in that it shows the presence in the atmosphere of very large quantities of coal ash or mineral matter, a condition which is not usually suspected. This dust content is undoubtedly due to improper methods of stoking and the forced drafts that carry out of the flue the ash which properly should fall to the ash pit.

By far the largest quantity of soot and ash was found in the samples collected in the vicinity of the railroad tracks. For instance, the average deposition at Meridian Street and the tracks was 47.07 pounds per acre per day as compared with the average for the entire district of 10.28. At Pennsylvania and the tracks the deposition was 26.72; at Alabama Street and the tracks, 47.82; at New Jersey Street and the tracks, 60.26; at East Street and the tracks, 41.04. The northern boundaries of the "mile square" show a relatively low soot content. At North and West Streets the deposition was 3.08 pounds per acre per day; at North Street and Capitol Avenue, 2.68; at North and Meridian, 1.50; at North and Pennsylvania, 2.54; at North and Delaware, 4.73; at North and New Jersey, 1.99; at North and East, 4.12.

Very low figures were obtained on samples collected at Ritter Avenue and Washington Street in Irvington where deposition of 0.85 pounds per acre was noted and at University and Audubon Road where the deposition was 0.96.

One of the worst conditions was in territory contiguous to the city hospital at Indiana and Athon streets where the deposition was 65.97 pounds per acre per day and at Hadley and Blake streets, 70.89.

The residential territory north showed a low deposition. At Pennsylvania and Sixteenth streets the amount was 1.05; at Pennsylvania and Twenty-first streets, 1.58; at Alabama and Twenty-first streets, 0.94; at Central Avenue and Twenty-first Street, 1.50; at Park Avenue and Sutherland Avenue the deposition was 0.68; at College Avenue and Fall Creek, 0.77.



This map was made up by W. D. McAbee, of the staff of the State Board of Health, to show the relative cleanliness of various parts of the mile-square downtown. The black spots indicate soot deposits. The number of the square was estimated from actual calculations of the amounts of soot deposited on snow during fixed periods and over definite areas in different parts of the downtown section. The snow and coal carbon over the areas tested were scraped together into receptacles and then the water was eliminated, showing how much dirt was deposited on that area. The section of the map representing the vicinity of the railroad tracks and the Union station is seen to be the depository for the most grime.

These figures are interesting in showing the relatively small quantity of soot and ash deposited in the residential district where, although much soft coal is burned, the atmosphere is far less heavily laden than in the manufacturing or railroad districts.

An examination of the map plainly shows the concentration of the soot and the great influence upon the atmosphere of the engines operating trains into the Union Station and adjoining freight yards.

THE CONTROL OF TEMPERATURES IN THE PASTEURIZATION OF MILK.

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In the August number (1912) of the AMERICAN JOURNAL OF PUBLIC HEALTH there appeared an article by me dealing with the pasteurization of milk, in which I made suggestions concerning the apparatus to be used for this purpose. In this article, mention was made of a somewhat new method of controlling the temperature to which milk is heated in the pasteurizing plants, which method is not at present in use at any pasteurizing plant so far as I know. I wish to elaborate a little more fully the manner in which this method could be applied to any form of milk heater which is in use at the present time without making changes which would involve any great expense.

There can be no question that the pasteurized milk which is the most desirable, conforms to the following conditions:

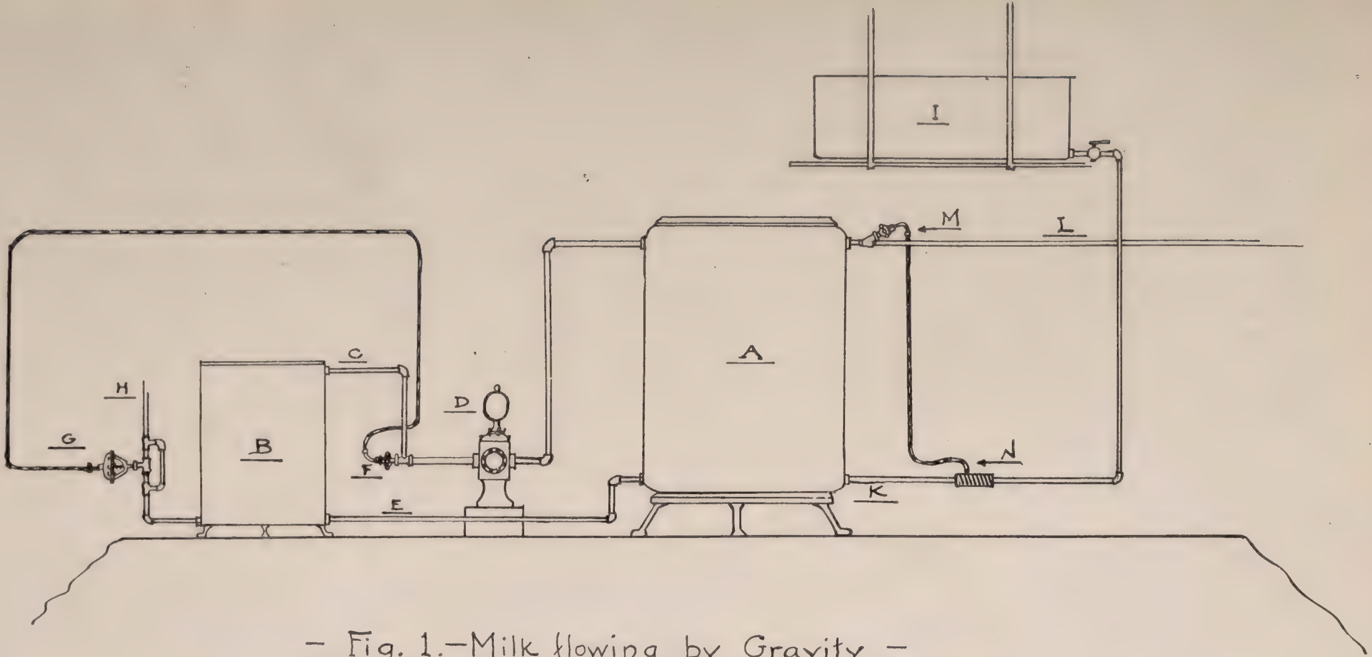
First.—The milk should be free from dangerous toxins which may result from the growth of an excessive number of bacteria present in the milk before being pasteurized.

Second.—All pathogenic bacteria should be destroyed and this involves, of course, the destruction of a large percentage of all bacteria contained in the milk.

Third.—The milk should not be subjected to an extremely high temperature since this would result in changing the constituent parts of the milk, give rise to a scorched or cooked taste, and interfere with what is known as the "cream line" when milk is bottled. Such milk would satisfy the demands of health authorities and would also be desirable from the standpoint of the milk dealer.

The point which I wish to emphasize in this article is the control of the temperature to which milk is heated.

The usual method of applying heat to the pasteurizer is either to introduce the steam directly into the heating chamber or to introduce it into the water which flows into the heating chamber. In either case, the chances are very great that some steam will strike the heating surface before it has become condensed and it will therefore cause some portions of the heating surface to become superheated. The milk which strikes these superheated points will be scorched and will impart a scorched taste to the whole body of milk, although the average temperature of the milk leaving the apparatus may be well below the temperature to which it is considered safe to heat it. In the ordinary pasteurizer also, the flow of milk is continuous and uniform, and it is the custom to regulate the temperature of the heated milk



– Fig. 1.—Milk flowing by Gravity –

A–Milk Heater.
B–Water Heater.
C–Water Discharge to Milk Heater.
D–Water Pump.
E–Water Return Pipe from Milk Heater.
F–Thermostat in Water Discharge Pipe.
G–Control of Stream Valve.
H–Steam Pipe to Water Heater.
I–Milk Tank.
K–Cold Milk Pipe to Heater.
L–Hot Milk Discharge Pipe.
M–Thermostat.
N–Valve Controlling Milk Flow.
O–Milk Pump.
P–Valve Controlling Steam.
R–Steam Pipe to Milk Pump.

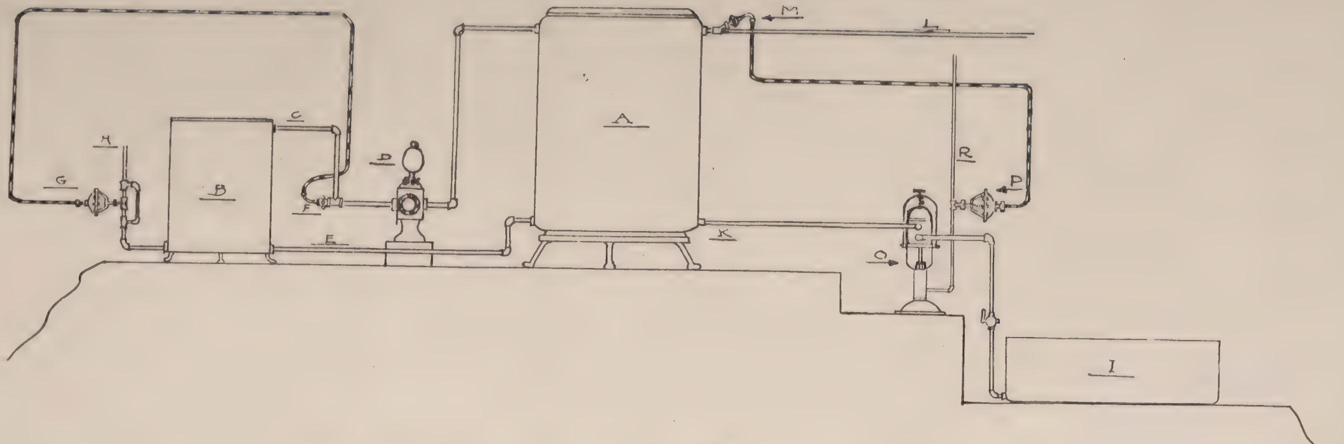
by varying the amount of steam which is introduced into the heating chamber.

In order to prevent superheating, it is desirable that the milk heating apparatus be so constructed that the heated surface with which the milk comes in contact shall never reach a temperature more than 15 degrees F. higher than that at which it is desired that the milk shall leave the apparatus. Since the milk temperature which authorities consider to be the most desirable is 145 degrees F., this means that the heating surface shall never have a temperature higher than 160 degrees F. Several manufacturers of apparatus for pasteurizing milk are now securing this condition by providing a separate tank outside of the milk heater, in which tank water is kept at a uniform temperature of say 160 degrees by means of a thermostat placed in the pipe through which this water is conveyed to the heater and controlling the flow of steam into the water tank. This heated water is then pumped through the milk heater. The greatest milk heating efficiency is obtained from hot water when it is moving rapidly through the heater and back to the water tank, in which case it will lose not over 5 degrees in temperature when returning to the tank.

So far so good.

The problem now presents itself of preventing the milk from falling below the desired temperature of 145 degrees F. when leaving the heater. Such a fall in temperature may result either from the milk being forced too rapidly through the heater and thus being discharged before it has time to take up sufficient heat from the hot water, or it may occur when the temperature of the inflowing cold milk suddenly drops below the usual point. This frequently happens when milk is received from farmers whose methods of cooling milk are not uniform.

When the water in a heating tank is kept at a uniform temperature by means of a thermostat, two methods are open for preventing the milk from dropping below the minimum temperature required. One of these methods is to so increase the heating surface in the milk heater that there will be such a wide margin of safety that no variation in the rapidity of milk flow and no variation in the temperature of the inflowing cold milk can be sufficiently great to cause the heated milk to fall very low in temperature. So far as I know, this is the only method now employed by any manufacturer of pasteurizing apparatus. This method, however, has this disadvantage that the largely increased heating surface requires a great deal of extra labor in cleaning the apparatus, and there is also the added increased danger from the leakage of the water into the milk when pipes are used which are liable to break. There is, however, another method open for controlling the temperature, namely, by attaching a thermostat to the outlet pipe through which the hot milk leaves the



-Fig. 2.- Milk pumped by Steam-

A–Milk Heater.
B–Water Heater.
C–Water Discharge to Milk Heater.
D–Water Pump.
E–Water Return Pipe from Milk Heater.
F–Thermostat in Water Discharge Pipe.
G–Control of Stream Valve.
H–Steam Pipe to Water Heater.
I–Milk Tank.
K–Cold Milk Pipe to Heater.
L–Hot Milk Discharge Pipe.
M–Thermostat.
N–Valve Controlling Milk Flow.
O–Milk Pump.
P–Valve Controlling Steam.
R–Steam Pipe to Milk Pump.

heater, this thermostat to control the flow of the cold milk into the apparatus.

It is evident that when the rapidity of flow is checked more heat will be taken up by the milk in its passage through the heater.

The accompanying cuts illustrate the method here described.

Figure 1 shows the arrangement of this device when the milk flows by gravity into the heater. The thermostat M controls the valve N located in the pipe through which the cold milk flows to the heater.

Figure 2 shows the arrangement of the device when the milk is pumped through the heater by means of a steam pump. In this case, thermostat M controls the valve P, regulating the steam which operates the pump, causing it to increase and decrease its speed. This in turn, of course, controls the flow of milk into the apparatus.

It is very probable that the idea here involved is patentable, but I have no desire to take any advantage of this fact. I have in the last year suggested this new method of control to many manufacturers and milk dealers and I now desire to make it known in a more public way, hoping that some interested party will make use of the idea which appears to be sound in theory and practical to use and should secure automatically a uniform temperature in the milk.

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

The annual meeting of the Massachusetts Association of Boards of Health was held at the Brunswick Hotel, Boylston Street, Boston, Thursday, January 30, under the presidency of Dr. Henry P. Walcott.

On the recommendation of the Executive Committee the following new member was elected:—

Dr. George T. O'Donnell, Billerica.

REPORT OF THE TREASURER.

DOCTOR CURTIS: Mr. President, I have here a brief account of the situation of the Association for the year.

Receipts.

Balance from 1911		$1,475.84
Annual dues 1911	$19.00	
Annual dues, 1912	475.00	
Balance of collection July meeting	12.00	
Interest on balances	46.56	
		552.56
		$2,028.40

Expenses.

Printing, etc., for the Secretary	$80.14	
Printing, etc., for the Treasurer	28.00	
Printing for Milk Committee	3.50	
		$111.64
Clerical assistance for Secretary	$12.00	
Clerical assistance for Treasurer	7.00	
		19.00
Arthur T. Lovell, reporting meetings		66.80
American Public Health Ass'n three issues of JOURNAL		193.00
Cigars		30.28
Sundry small items		3.83
Crêpe paper for July meeting	$3.00	
Rubber stamp for Treasurer	.83	
Total expenses		$424.55
Balance to 1913		1,603.85
		$2,028.40

Of the above balance $1,040.40 is in the West Newton Savings Bank and $563.45 on deposit in the First National Bank of West Newton.

The item for cigars is rather large, but there were three bills of the previous year which had been forgotten by the Brunswick.

The agreement with the American Public Health Association in regard to printing the JOURNAL which was in existence last year has just been renewed, so that it will be continued in the same way for the coming year.

Respectfully submitted,

FRANCIS GEO. CURTIS,
Treasurer.

REPORT OF THE LEGISLATIVE COMMITTEE.

The Legislative Committee submits the following report on matters pertaining to public health that have been introduced up to this time at the present session of the Legislature.

Senate 42, introduced by the Massachusetts Milk Inspectors' Association, calls for the establishing of a standard for cheese. It is in the interests of pure food.

Senate 43, introduced by the Massachusetts Milk Inspectors' Association, calls for the establishing of maximum amounts of water to be allowed in butter, renovated butter and oleomargarine. In the interests of pure food.

Senate 44 is the official bill of the Massachusetts Association of Boards of Health. In fixing a state standard for bacteria permissible in milk intended for sale it does not render it mandatory for local boards of health to enter upon the work unless they so desire, but does give to the State Board of Health the authority long needed by them to proceed against dirty milk. Kindly instruct your representatives in the Legislature to assist this important measure to become law.

Senate 45, introduced by the city of Boston, calls for definition of terms "milk" and "pure milk" as used in certain statutes. In the interests of pure food.

Senate 46, introduced by the city of Boston, is mainly similar to Senate 45.

Senate 47, introduced by the city of Boston, is the bill that has appeared for two seasons past and which has twice failed. It authorizes the issuing of "permits" for sale of milk and cream by local boards of health. Such authority would be of value to local boards, but our efforts should be concentrated on Senate Bill 44.

Senate 72 was introduced by Dr. Lyman A. Jones of North Adams. It allows county commissioners to establish county laboratories if they so desire. In the western part of the state there seems to be some demand for a county laboratory, owing to the length of time that it takes to get specimens down to Boston to the State Board. This is not mandatory upon county commissioners, but is permissible.

Senate 91, introduced by the city of Boston, provides for cleanliness of milk containers and utensils. Desirable legislation.

Senate 92, introduced by the city of Boston, provides for establishing a bacterial standard for milk. The subject is far better and more fully covered in Senate Bill 44. This bill is unnecessary.

Senate 118, introduced by the city of Boston, provides for the exclusion of certain deleterious substances from confectionery. In the interests of public health.

Senate 119, introduced by George S. Fuller, calls for the proper labelling of insecticides. Desirable legislation.

Senate 163, introduced by F. S. Richardson, restricts the use of the common drinking cup, and is a bill carrying a little farther the common drinking cup law which is already upon the statute books. It is in the interest of public health.

Senate 170, introduced by John Griffin, is one of the three bills which provides for reorganization of the State Board of Health, and in the opinion of your committee ought not to pass.

Senate 340, introduced by J. L. Johnson, provides for the establishment of a standard of ice cream. In the opinion of the committee the standard established by this bill is too low, as it provides for 8 per cent. fat in ice cream, whereas the Federal standard provides for 12 to 14 per cent. of fat.

House 92, introduced by Thomas J. Giblin, provides for the marking of articles of food that have been held in cold storage, and appears to be desirable legislation.

House 93, introduced by the city of Boston, prohibits the sale of confectionery containing mineral substances. As mineral matter is a natural component part of many of the materials now used in the manufacture of confectionery, it is felt that this bill is somewhat ambiguous.

House 97, introduced by the city of Boston, calls for the establishment of a department of diseases dangerous to the public health by the State Board of Health, and appears to be desirable legislation.

House 283, introduced by the city of Boston, calls for the establishing of a standard for cheese. This is similar to Senate Bill 42, but is not quite so complete.

House 284, introduced by the city of Boston, calls for the establishing of maximum amounts of water to be allowed in butter, renovated butter and oleomargarine. It is similar to Senate Bill 43, but not quite so complete.

House 351 is a resolve in regard to the expenditure of $10,000 for a State Board of Health investigation of infantile paralysis. That has been done for some years.

House 352 calls for weekly reports to the State Board of Health by local boards of health in regard to certain diseases, and this appears to be desirable legislation.

House 353 is a bill, recommended by the State Board of Health, relative to the sale of drugs, differing from the professed standard under which they are sold.

House 393 is the Ellis Bill, introduced this year by Richard M. Bradley. While there appear to be a number of small contradictory provisions in this bill, and while it appears to deprive local boards of health of revenue now received from milk licenses, on the whole this bill appears to be fair and should be endorsed by this Association.

House 481, introduced by the Massachusetts State Branch of the American Federation of Labor to reorganize the State Board of Health, would substitute for the present board a paid board to consist of five members, "one of whom shall be a sanitary engineer, one a pharmacist and three of them persons learned in the sciences of medicine and hygiene." While there are some good features about this bill, your committee is not prepared to recommend its enactment.

House 482, introduced by Andrew Moran, Jr., to insure the purity of vaccine virus. This appears to be aimed at the general idea of vaccination, and your committee urges its defeat.

House 856, introduced by P. Joseph McManus, to require labelling of receptacles for milk and cream containing formaldehyde or other preservative. As the statutes expressly forbid the use of any preservative in connection with milk intended for sale this bill can serve no good purpose and its defeat is urged.

House 857, introduced by John F. Meaney, for labelling of milk as to its source and treatment. This bill has merit. Your committee is of the opinion, however, that the section giving authority to local boards to designate terms or phrases should be delegated to some state authority, such as the State Board of Health and Dairy Bureau, jointly, in order to prevent possible multiplicity of phrases.

House 961, introduced by George C. Stearns, who is the secretary of the Massachusetts Association of Relief Officers, practically the overseers of the poor, is relative to the expense of caring for persons infected with diseases dangerous to the public health. This bill will affect local boards of health, in that it is a measure which is intended to place upon the boards of health the determination of settlements, which is now done by the overseers of the poor. This bill transfers from the overseers of the poor to local boards of health the determination of settlements in cases of communicable diseases, or diseases dangerous to the public health, which are cared for by local boards of health. You know that now a case that is reported to your board is referred by you to the overseers of the poor to determine the settlement. This bill will take that determination away from the overseers of the poor and put it back upon you as a board of health, and in view of the fact that the settlement laws are intricate and that overseers of the poor have done this work for years and have the necessary machinery, your committee is of the opinion that this bill should be defeated.

Finally, House 964, introduced by Edward F. McSweeney, calls for reorganization of the State Board of Health. It calls also for carrying out of its rules by local boards of health, who at the discretion of the State Board of Health may be subjected to fines of $25 to $500 or to imprisonment for six months, or to both such fine and imprisonment. Your committee feels that members of local boards of health have already troubles enough without such possibilities hanging over them, and urges the defeat of this bill.

George E. Bolling,
Chairman.

It was moved that the report of the Legislative Committee be accepted and printed for the benefit of the local boards of Health of the Commonwealth.

(Motion was seconded and adopted.)

Election of Officers.

Doctor Woods: I move that the chairman appoint a committee of five to bring in nominations for officers for the ensuing year.

Doctor Kennedy: I move as an amendment that officers be nominated from the floor. I should like the President and Vice-Presidents nominated from the floor.

The President: The question is upon the amendment offered by the gentleman upon the right. Are you ready to vote?

(Upon a viva-voce vote the result was in doubt. A hand vote was taken and the amendment was rejected, 9 for, 15 against. The original motion was then adopted.)

The President: I will appoint as members of that committee Dr. Woods, Dr. Stevens, Dr. Tobey, Professor Phelps and Dr. Kennedy.

Doctor Woods: Mr. Chairman, the Committee on Nominations wish to report the following:

For President, Dr. S. H. Durgin, of Boston.

For First Vice-President, Prof. W. T. Sedgwick, of Brookline.

For Second Vice-President, Dr. C. V. Chapin, of Providence, R. I.

For Secretary, James C. Coffey, of Worcester.

For Treasurer, Dr. Francis G. Curtis, of Newton.

For the Executive Committee (for two years): Dr. M. V. Pierce, of

Milton; George E. Bolling, of Brockton; Dr. H. L. Chase, of Brookline; W. L. Underwood, of Belmont, and Dr. F. A. Woods, of Holyoke.

It was moved that the Secretary be authorized to cast one ballot for the names reported by the committee.

PAPERS PRESENTED.

The following papers were then read:—

"How Shall We Spend the Health Department Appropriation?" by Dr. C. V. Chapin, Providence, R. I.

"Casual Observations on Sanitary Matters Gathered in Germany," by Dr. Theobald Smith, Harvard University.

RETIREMENT OF DR. WALCOTT AS PRESIDENT.

DOCTOR STEVENS: My object in rising is to move that the thanks of this Association be presented to Doctor Walcott, our retiring President, for his long and faithful service as President of this Association.

PROFESSOR SEDGWICK: I second the motion, and may I make a few remarks? Gentlemen of the Association, the announcement that Doctor Walcott will no longer be our president comes as a great surprise. I think it is only the older members, like Doctor Durgin and myself, who have perhaps the fullest knowledge of the great service which Doctor Walcott has done, not only to this Association, but to the whole state of Massachusetts and to sanitary and medical science all through the United States. Doctor Walcott has brought distinction to this Association by his long presidency of it, and we as members ought to feel, and do feel, very proud that we have had him for so long a time as our presiding officer. His name is known all over the world. We all felt pride when he was chosen as the president of the great International Congress of Hygiene and Demography in Washington last September, over which he presided with so much skill and dignity, but as members of the Massachusetts Association of Boards of Health we have tenfold cause to be grateful for his long service to us. Doctor Walcott began his great work for this state many years ago; I think it is more than thirty years ago, certainly about thirty,—I mean in an official capacity. He was early connected with all those movements which afterward ripened into the work of the State Board of Health,— the reorganized board which dates from 1886. He was on the old Board of Health, Lunacy and Charity. He was on the Massachusetts Drainage Commission, which attacked metropolitan sewerage problems in the late eighties, and he more than any man in New England has shaped the progress of public health science in this state and in all New England if not in America. If, therefore, he is to resign his post at this time he ought to have and will have our heartiest thanks and our congratulations upon the great work which he has been able to do for the state and the nation, as well as for this little Association which has held us altogether so many years as believers in sanitary science and public health matters and has been an example to the rest of the country in the good work that it has done.

Doctor Durgin: Gentlemen of the Association, I feel, as I think all of you feel, exceedingly sorry that the time has come when we can no longer persuade our graceful and logical head of the Association to remain. We have been doing it for a great many years, and he has reluctantly but kindly yielded to the importunings until the present time. We all know what it means to have an association led along with such even, peaceful and successful work. This Association has passed from a small handful to a large sized and successful organization. We can only hope by pulling together very hard in the years to come to keep up with the progress which we have been blessed with in the last twenty-two or twenty-three years. He is not only the logical and pleasing leader of the Association, but he has been the wise counsellor, which he has been in all other positions and affairs in the public health work with which he has been connected in this country. No one can feel this more than I do at the present time, and I feel it particularly because I have been persuaded against my wishes to take his place.

I thank you, gentlemen, from my heart, for this new expression of your confidence. Let us pull together, but never forget our great loss of so graceful a head as has retired today.

The President: Gentlemen, I need not say that it has been somewhat embarrassing to sit here and listen to these very kind expressions. I do not feel, however, that I should be honest to myself if I did not repeat what I have often said, that this Association seemed to me upon the whole one of the most valuable organizations in the state of Massachusetts that had anything whatever to do with the questions of the public health. I have always believed that the real administration of the public health of this Commonwealth rested with the local boards of health. There is a State Board of Health at the State House, but I have always insisted upon it, and I think the board has agreed with me in this, that its functions, except in a very few instances, must be advisory functions, that it must not attempt to meddle with the local administration of the public health where the laws of the Commonwealth have so safely left it. There must be advice, there must be the assistance of the Commonwealth for a great many questions, but the questions that mean more to the people of this Commonwealth than any others are the questions that should be decided within the limits of each municipality of this state. I therefore have taken an immense interest in the well-being of this Association. I don't agree at all with Doctor Durgin that I have been anything more than an associate here who has endeavored at all times to carry out the wishes of the body which was good enough to ask him to preside over it, and I am very sure that whatever service at any time I may have been able to render here, Doctor Durgin can render at least an equal one, my own feeling is a greater one, because he really has borne more of the responsibilities of the work of this Association than I have. I believe, gentlemen, that the Association is entering upon a period of greater success than it has ever had.

(The motion to extend a vote of thanks to the retiring President, Doctor Walcott, was put by the President-elect, Doctor Durgin, and was adopted unanimously.)

BOOK REVIEWS.

Sex Education. *By Ira S. Wile, M.S., M.D. 12mo. pp. 148. Duffield and Co. New York, 1912.*

This is a somewhat superior specimen of the host of manuals now in print regarding the subject indicated by the title. It is aimed particularly to guide fathers and mothers in giving instruction to their children at different periods. Three of these periods are recognized, first, that of childhood, "The Age of Mythology." This is described with much insight and sympathy as an age uncolored by sexual feeling when the facts of birth can be discussed in a most matter-of-fact way. The second is that of puberty, "The Age of Chivalry," in which the maintenance of confidential relations is far harder but not less necessary. Later adolescence is thoughtfully characterized by the author as "The Age of Civic Awakening," a time when duty toward society may be urged with some success as a ground for personal self-control.

The book is written with literary skill and Doctor Wile is to be commended for giving far greater emphasis to high ideals for conduct than to the possible penalties for delinquency.

Percy G. Stiles.

Home Hygiene and Prevention of Disease. *By Norman E. Ditman, M.D. 12mo. pp. 333. Duffield and Co., New York, 1912. Price $1.50.*

This is a small encyclopædia treating in alphabetic succession a series of topics related to health and disease. Common ills both trifling and grave are discussed and measures preventive and remedial are proposed. It is difficult to judge how far such a book is likely to serve its purpose in the hands of the average layman. It is distinctly entertaining and he will probably enjoy random readings concerning disorders which are not familiar to him by experience; whether it will greatly help him in solving his own personal problems is more questionable. Its statements seem generally accurate if a little dogmatic. The prominence given to drugs useful in different cases appears undesirable. The size of dose is carefully mentioned each time and the tendency to encourage self-treatment, often with powerful medicines, is to be deplored. The author himself warns against this in his introduction but his word of caution might too easily be overlooked. There is a sane and charitable section upon the use of alcoholic beverages.

Percy G. Stiles.

American Pure Food and Drug Laws, *by James Westervelt, M. A., of the New York, New Jersey Bars. 1535 pages bound in buckram, price $7.50. Vernon Law Book Co., Kansas City, Mo., 1912. (Can be ordered through this Journal.)*

This book will be indispensable to all actively engaged or interested in the administration of the pure food and drug laws of this country. The introductory chapter on the purpose and scope of federal and state laws is followed by a very admirable exposition dealing with the administration and enforcement of the laws and then specific chapters dealing with adulteration, misbranding and special laws. The laws of every state in the Union have been carefully collected, collated, and abstracted in such a way that one can get information very quickly without having to laboriously wade through great quantities of material. The book is supplied with a very thorough index.

PUBLIC HEALTH NOTES.

Poliomyelitis and Dogs.

H. F. Langhorst, M.D., in the *Journal of the American Medical Association*, for December 28, 1912, considers the possibility of the transmission of poliomyelitis through the dog. He calls attention to Professor Rosenau's findings concerning the stable-fly, reports two cases in which dogs may have been instrumental in infection, and briefly presents his own theory as follows:—

"Poliomyelitis is undoubtedly transmitted to man through more than one intermediary. We know one to be the biting fly. We also know that the monkey may harbor the infection for some time after being a victim of the disease, and thus be a carrier. The biting fly attacks animals and transmits the contagion. The dog is subjected to the bite of this fly and may become infected. The dog may contract the disease in one form or another, and be an active carrier of the virus for some time.

"Dogs are numerous in the countries that have suffered most with poliomyelitis; dogs are also more numerous in country districts, where the disease is most prevalent. I consider these facts significant, especially in connection with two cases in my practice in which dogs may have been the agents of transmission."

The Problem of Sanitation of Railway and Street Cars.

In a recent issue of the *Dietetic and Hygienic Gazette* (February, 1913), appears a very interesting editorial on the problem of sanitation of railway and street cars, which concludes as follows:—

"In both railway cars and street cars the main factors of good sanitation are heating and ventilating, and cleaning. Cars are too frequently designed for show and rapid handling of passengers than with the view of proper ventilation, adequate heating and of rendering the car accessible for thorough cleaning.

"Many cars, gorgeous to the eye, in plush and hangings, are really whited sepulchres. Their appointments and construction make it difficult, well-nigh impossible, to clean them thoroughly and their plush and their hangings provide ever ready receptacles for dust and dirt. As to heating, the same thing may be said of American railway trains as of American rooms and buildings: they are almost always overheated.

"The reforms to be suggested in railway trains are (1) an adequate and sufficient system of heating and ventilation; (2) the abolition of the present style sleeping car and the substitution of sleeping accommodations, healthier and more efficient; (3) the construction of railway cars and street cars on more simple lines to facilitate proper cleaning. If physicians and the community at large will insist that measures of this kind are in the interest of the public health and must be undertaken, the poor, hardly used railway companies cannot but bow to the inevitable."

Birth Registration.

"The Children's Bureau devotes this its first monograph to birth registration, because the adequate recording of births is fundamentally necessary to the studies of child welfare which the Bureau is directed by law to undertake, and, more important, because universal birth registration will prove of great practical value to the people of the United States."

Thus the Bureau's recently published monograph introduces the subject of birth registration, and deals, in the first place, with its importance as a basis of the study of infant mortality. The pamphlet gives Dr. Cressy L. Wilbur as the authority for the statement that "approximately 300,000 babies die yearly before they reach the age of twelve months." It is estimated by the Bureau of the Census that "in the last decade (1901–1910) more than 2,500,000 of the children born in this country died before they reached the age of one year."

"What do these figures mean? In terms of total population, it is as if Chicago, the second city of the United States, were to be wiped out of existence once every ten years, not a single life being saved. It means the annihilation each decade of a population as large as that of the State of New Jersey, and greater than that of such States as Alabama, California, Iowa, Kentucky, Minnesota, North Carolina, Tennessee, Virginia, or Wisconsin. In fact, only ten States in the Union had each in 1910 a population as great as the infant mortality for the preceding decade. This mortality nearly equalled the combined population of Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, and Nevada.

"If none of these infant deaths was preventable, we should have no stimulus for trying to find a remedy; we should be obliged to bow to the inevitable. But we are assured by the highest authorities that the number of deaths can be greatly reduced if we apply the best methods of the growing science of sanitation. This challenges the attention and the earnest efforts of all public spirited men and women. When we are told by the New York City health department that 'Public health is purchasable; within natural limitations a community can determine its own death rate,' we must entreat even the busiest to pause long enough to do what he can, in his own way, to set in motion the machinery through which this sacrifice of life may be checked."

The Causation of Pellagra.

An interesting article on the causation of pellagra appeared in the January 25th, 1913, issue of the *Journal of the American Medical Association.* After pointing out the facts bearing on the question, the authors, Allan H. Jennings and W. V. King, reached the following conclusions:—

"If pellagra is caused by an infection, especially if of protozoal origin, and is transmitted by an insect, the present state of our knowledge leads us to the provisional belief that the following deductions may be tenable.

"Under the conditions existing in the region of pellagrous endemicity in South Carolina, the lice, fleas, mosquitoes and bedbugs show characteristics of habit, distribution and abundance which appear to exclude them from serious consideration in this connection.

"The biting habits and, to a certain extent, the distribution of the flies of the genus *Simulium,* together with their lack of habits which bring them into close association with man, seem to present weighty arguments against the incrimination of these gnats as the active agent in the transmission of pellagra.

"The cosmopolitan biting stable-fly, *Stomoxys calcitrans,* from its distributional and biting habits, its close association with man, its conformation to the obvious requirements of the disease-transmitting insect and the agreement of its special characteristics with the phenomena incident to the occurrence of pellagra, offers strong reasons for its consideration under the premises.

"It is hoped that attention may be directed to this fly and observations bearing on its possible relation to the disease be generally made.

"We would add that, should a causative organism be shown to exist which is a bacterium rather than a protozoon, and should this organism invade the body through either the mouth or the skin, the house or typhoid fly, *Musca domestica,* and the flies whose habits at all resemble it, would lie under strong suspicion. It is needless to say that the house-fly is excessively abundant and of universal distribution in the region studied.

"We are also aware that the communication of pellagra in a purely mechanical manner by biting insects is a possibility and, if shown to exist, would radically change our ideas as to the insects which may be involved.

"Finally, we wish to repeat that essential uniformity of causation must be assumed to exist universally and that the demonstrated failure of a supposed etiologic factor to account for the phenomena of pellagra in one locality must serve to exclude it from consideration as a factor in another."

Malaria Near Farmhouses.

"Senior Surgeon Henry R. Carter, in *Public Health Reports No.* 105, summarizes the information we have concerning the spread of malaria, a disease, as he says, essentially rural in its occurrence, for the benefit apparently of dwellers in the country. The characteristics of the guilty mosquito are fully described as well as its habits, how it travels and breeds, and how its surreptitious nocturnal invasion of houses has led to the bewilderment of men trying to account for an outbreak of malaria where no evidence of the presence of anopheles was discoverable.

"The article goes on to describe the measures involving the control of the human host by keeping him under screens and mosquito bars, administering quinine freely, killing the mosquitoes of the sickroom, and rendering possible carriers innocuous by the prophylactic use of the specific alkaloid. To control the insect host, Surgeon Carter advises the destruction of their breeding places by drainage, enabling fish to get at the larvæ, pouring coal oil on larger ponds, cutting down brush and tall weeds about the house, yet planting a screen of trees between possible breeding places and the dwelling, use of screens and mosquito bars, etc. Full instructions are given how to construct the wire screens, including the doors. An interesting point is that collections of dirty water are not to be feared, as mosquitoes will not breed therein. It is to be hoped that some brave pioneer farmer, not susceptible to ridicule, will be found in every infested locality to carry out Surgeon Carter's excellent advice."

New York Medical Journal, January 25, 1913.

Important Milk Resolutions.

The conference of the delegates appointed by the governors of the Eastern and Middle States, called by the New York Milk Committee to consider improvement of state laws for the control of milk industry and for the suppression of tuberculosis met in New York February 5 and 6, 1913.

The following recommendations were adopted by the delegates and were based essentially on the findings of the National Committee on Milk Standards published by the United States Government last year. The resolutions are here given in full:

Resolved, That the inspection of dairy farms should be under the supervision of the state authorities.

Resolved, That the state control of the dairy inspection should be centralized in the Department of Agriculture or the department having jurisdiction over live stock.

Resolved, That it be the function of the State Department of Agriculture, or department having jurisdiction over live stock to perform the following work: Veterinary inspection of dairy cattle including physical examination and tuberculin tests, sanitary inspection of dairy barns and their surroundings, water supply, drainage systems, etc.

Resolved, That the following work be performed by the State Department of Health: Medical inspection of dairy employees and milk handlers at creamery and shipping stations; sanitary inspection of human dwellings, water supply, drainage systems, milk houses, shipping stations, factories, etc., and laboratory tests of milk.

Resolved, That the state milk control extend over the manufacture and handling of milk products.

Resolved, That all dairy herds be registered, classified and graded by the State Department of Agriculture as follows:

Class A—herds tuberculin tested and physically examined.

Class B—herds not tuberculin tested but physically examined.

Class C—herds not tuberculin tested and not physically examined.

Resolved, That all dairy buildings, equipment and methods be registered, classified and graded by the State Department of Agriculture as follows:

Buildings and Equipment.

Class A. Eighty per cent. and above, equal to 32 points and above on U. S. Score Card.

Class B. Sixty per cent. to seventy-nine per cent. equal to 24 to 31 points on U. S. Score Card.

Class C. Below sixty per cent. equal to below 24 points on U. S. Score Card.

Methods.

Class A. Eighty per cent. or above, equal to 48 points on U. S. Score Card.

Class B. Sixty per cent. to seventy-nine per cent. equal to 36 to 47 points in U. S. Score Card.

Class C. Below sixty per cent. equal to below 36 points on U. S. Score Card.

Resolved, That milk as delivered on the market be classified and graded.

Resolved, That the control of local milk supply by municipal and town boards of health should include the following duties: issuance and revocation of licenses of local distributors; classification and labeling of milk; inspection by local inspectors of all places where milk is received, handled and sold; laboratory tests to determine the efficiency of pasteurizing machines and methods; maintain records of inspection and all laboratory tests; utilization of results of inspection and laboratory tests in conjunction with reports from the state authorities of dairy inspections in exercising control over milk distributors; educate the consumer in the value, use and care of milk.

Resolved, That it is unnecessary and inadvisable to demand the destruction of cattle reacting to tuberculin unless they show signs of generalized tuberculosis.

Resolved, That the dairy products from such cattle as react but do not show signs of tuberculosis on physical examination should be subjected to such measures as will render their products safe for the food of man or animal.

Resolved, That the payment for cattle slaughtered after reacting to the tuberculin test should be made only to the original owners.

Resolved, That all animals destroyed by the state should be paid for.

Resolved, That quarantine should be approved of as a means of protecting states against interstate traffic in diseased cattle.

Resolved, That it should be made illegal for any person to move cattle or sell them without permission of the state authorities if they have been warned by such authorities that they are diseased.

Resolved, That the cattle commissioners or those having charge of diseases of animals should have authority under the law to brand animals that have reacted to the tuberculin test or been condemned on physical examination.

Resolved, That all tuberculin tests be reported to the state authorities and these placed on file by the state authorities.

Resolved, That the physical examination of all animals by qualified veterinarians be made compulsory.

Resolved, That careful attention should be given by states in regard to disinfection of premises that have been inhabited by diseased cattle.

Resolved, That the several states empower those having supervision of the milk supply to coöperate with each other in reference to the control of interstate shipment of milk.

Resolved, That each state be urged to deal with the problems discussed as nearly in conformity with the resolutions endorsed as the local conditions permit.

Dental Hygiene; Its Real Significance.

"Until very recently the necessity of caring for the mouth and teeth of children has not been a matter of public interest. An important part of medical inspection in schools has been neglected. Medical school inspection is the most important work carried on by departments of health; it is one of the most important functions of the state.

"By the practice of dental hygiene the general public health can be greatly improved. In the fight against the great white scourge, tuberculosis, it is a factor of the first importance.

"Dental hygiene is the practical application of dental science to the individual, the home and the school. A realization of its importance is needed. Everybody should know that the general health of the individual and of the community depends largely upon the condition of the mouth and teeth; that the highest efficiency and happiness in life can not be gained when the gateway to the body is neglected.

"The care of the teeth is an important factor in the care of the child. The mental and physical efficiency of school children can be greatly aided by the proper care of the mouth and teeth. This is fully attested by experiments in Germany, which cover a wide field. There dental infirmaries connected with the schools have been in operation for a sufficient length of time to demonstrate:

"First—That the time expended in putting the teeth in order was far less than the time formerly lost from toothache and disability caused by diseased teeth.

"Second—That the cost of keeping the teeth in order was more than compensated for by better health and a consequent reduction in medical expenses.

"Third—That the child became physically stronger, secured a higher average in his studies, was easier to control and was apparently happier.

"A clean mouth and clean teeth furnish one of the best protections against disease. A child forced to swallow the discharges from an unclean mouth, and having nutrition interfered with by his inability to chew his food, is unable to resist disease.

"The condition of the teeth is a telltale as to diet. They are the guards which stand at the gateway to the body, ready to divide the food into manageable portions, to bring peace of mind and healthful bodily activity. No greater kill-joy exists than dyspepsia, no more vicious a menace to life and efficiency obtains than disordered condition of the process of nutrition.

"Cancer of the stomach is notoriously a disease of gross feeders. Eighty per cent. of the cancers of the stomach arise from bolted food. If an ounce of prevention is ever worth a pound of cure it is keeping the teeth in good condition.

"This problem of dental hygiene is not altogether one of benevolence. It is in large measure a problem of economics. Health is needed for great industrial production. Every case of disease involves an immediate economic loss to the community in which such events occur. There is coming a great change in the practice of medicine, surgery and dentistry and a much greater proportion of the attention of these professions in hereafter to be devoted to prevention rather than cure."

Monthly Bulletin, Indiana State Board of Health, November, 1912.

The Death Rate per 1,000 of Population in the Age—Period over 55 Years.

In the report of the chief medical officer of the Local Government Board, England, for 1911–12 just issued is a study on "Arterial Degeneration and Premature Old-Age." A further statistical study has been made in the death rates in the later years of life, which begins by pointing out that progress has been made in the reduction of infant mortality during the past thirty years. The improved sanitary conditions of living had not so far shown but little results, in persons over 45 and none in those over 55.

In the table given (−) means a decrease in the death rate per 1,000 of persons living in any decade in an average population and (+) means an increase of deaths.

Age Period.	Male.	Female.
45–55 years	(−) 3	(−) 15
55–65 years	(+) 9	(−) 7
65–75 years	(+) 8	(−) 1

The report states "The increase in the death rate amongst men at ages 45–65, when 1841–45 is contrasted with the period 1861–65 to 1891–95 inclusive and the failure to decline during the same period of the death rate in women at the same ages are facts of great social importance, whatever explanation be given them.

"In view of the immense improvement in this country in the death rate during youth and early adult life . . . there can be no reasonable doubt that much mortality in adult life, which anticipates death in old age is preventable in character and should be prevented.

"Two circumstances have doubtless been largely instrumental in keeping up the death rate to an unnecessarily high figure. These are the rapidly increasing aggregation of people in towns and the associated industrial conditions affecting large masses of the people both male and female.

"At the age period 55–65 in man, however, there is no clear indication of material improvement, though improvement is shown in women at the same period of life. This continuance of an excessive death rate at a time of life when a man's experience may be regarded as especially useful to the community, evidently calls for investigation."

It has been suggested "that those subject at the ages of 55–65 to the causes of mortality during the last ten years 1901–10 were born in what was relatively speaking a presanitary period, were subjected in their early life to conditions more adverse to future long life than men have been whose birth is of more recent date. This suggestion does not explain international differences in the death rates at ages 55–65; but on this point it has to be borne in mind that the countries comparing favorably with England and Wales have as a rule experienced much less urban and industrial aggregation than this country."

At the age period 55–65 about one third of the deaths were due to diseases of the heart and blood vessels. . . . "A very large share of the high mortality from diseases of the heart and blood vessels is caused by degenerative changes at the ages 45–55 and 55–65 which form an important anticipation of senility in the tissues on whose integrity, life and health chiefly depend."

These quotations are made at length in view of the interesting discussion which has been going on in "the New York papers on the notable increase in deaths per 1,000 in persons after 45 years." The fallacy in the argument set forth mathematically viz.: That in any given population of 100 per cent. there must of necessity be a higher mortality in the later age periods, because of a larger percentage of lives carried over from early years seems apparent, when the total deaths in any period are divided by the total population for any given country for that age period as taken from the census.

The very extended investigations into *arterial degeneration* in the English Report while being purely pathological is invaluable in pointing out the relationship of these old-age changes in tissues; while from the hygienic standpoint, it is of extreme importance to the people of this continent where "rush" and competition have made life so strenuous with the facilities of railway, tramcar, telegraph and telephone, to consider whether or not the human machine is able to withstand the stress. Perhaps the illustration of the automobile which can do its 10,000 miles with but slight repairs if driven moderately as compared with that much used up by "scorching" before 5,000 miles are done may not be inapplicable.

Milk Standards.

"According to a French authority standard hygienic milk should have been put through the following processes:

"1. Analysis and testing to remove watered, skimmed, soured or low-grade milk. 2. Filtering or straining to remove mechanical impurities, such as hairs, dust, etc. 3. Pasteurization at a temperature above 176 degrees Fahrenheit and immediate cooling to about 40 degrees to destroy pathogenic microbes, such as those of tuberculosis, diphtheria, typhoid fever, etc. 4. Bottling or sealing in sterilized containers. It should then be kept at a low temperature until sold.

"The first country to establish this standard of milk was the Argentine Republic, which enacted statutory regulations as long ago as 1890. These were soon followed by similar laws in various European countries. In Argentina the treatment described has become obligatory."

Public Health Journal, January, 1913.

The Tuberculosis Question from a French Report.

"The board of health of the city of Paris has published its report on the tuberculosis question (and also on the cancer question) for the year 1911; it contains very interesting material that should be studied by every member of the boards of health of the large cities of our country.

"The Paris board of health has made observations on the tuberculosis question for eighteen years, during which time an attempt has been made to get at the root of the evil, that is, the elimination of such rooms and houses as from their position could be taken as breeding places of the disease. While the first twelve years did not show any improvements, as during this time the work was very much handicapped, there appeared in 1909 a change for the better. In January, 1905, 5,623 houses were designated as needing improvement, but of this number 1,090 were boarding houses which could not under the law be attacked, and of the rest, fifty have been torn down. Others have been improved, so that at present only about one-third remain to be changed. The great disadvantage of the building laws of Paris is that for a dwelling house thirty metres high, a court of only six metres need be provided, and in a street of twelve metres width, houses may be built eighteen metres high. Thus, even comfortable apartment houses have a lack of court space. This drawback, by the way, is to be found not only in Paris, but also in London and Berlin, in which latter capital a room with very little air and light, generally used as a dining room, has received the name of *Berliner Zimmer*, as it is peculiar to houses found in the German capital. Our readers will be astonished at the statement coming from a Parisian source, that the French capital has the least space given for public places, gardens, and playgrounds of all the capitals of the world.

"The report accepts the English statement, that there is one death from tuberculosis to about five patients. The number of deaths for 1911 is given as 9,371, seventy-eight less than in 1910, 343 less than in 1909, and 891 less than in 1908."

New York Medical Journal, February 8, 1913.

Principles of Governing Water Pollution.

Mr. Paul Hansen sent a list of questions to one hundred and twenty sanitary engineers and officials upon the above mentioned topic. The following fundamentals seem to be the concensus of opinion as interpreted by Mr. Hansen:

1. No stream unless the entire watershed is owned or controlled can be maintained in original purity.

2. Streams can be maintained free from danger to public health, inoffensive and decently clean.

3. Water supplies may be drawn from moderately polluted streams, the extent of permissible pollution being determined by the limitations imposed by the art of water purification.

4. The desirability of maintaining fish life in streams is purely an economic matter.

5. Stream pollution is primarily a menace to public health.

6. Ascetic considerations and civic decency must always be factors.

7. The enforcement of general laws in the hands of central expert authority enabled to specify enactments forbidding water stream pollution is feasible.

Symposium, Edited by Paul Hansen. Engineering News, 67, p. 839.

Typhoid Outbreak at Cedar Falls, Iowa.

A sudden severe epidemic of typhoid fever at Cedar Falls described by A. L. Grover and R. B. Dole, in the *Engineering News*, 67, p. 526, offers an excellent example of the evident pollution of a spring supply considered above suspicion. The city is situated on Cedar River and has a population of 5,000, in addiion to about 1,000 students at the State Teachers College. There has been little typhoid in the town previous to the present outbreak. Careful investigation of the milk supply showed that no milk man had a disproportionate number of cases among his customers and 16 per cent. of the people denied using milk in any form. The age distribution of the cases did not indicate a milk epidemic.

The water supply is from springs on the banks of the Dry Run. The springs issue from limestone one or two feet above the level of the river. The discharge is about 6,000 gallons per minute. The rock from which the springs issue underlies deep drifts in a large area of Iowa, but at Cedar Falls it forms a bed of the Dry Run and Cedar River and it is covered throughout the greater part of the city by coarse gravel five to fifteen feet thick. It is full of crack sand crevices. Many old dug wells penetrate the limestone in the city and are used for the disposal of slops and waste.

Chemical analyses of the water during four or five years past have not shown any contamination, and bacteriological examinations of several samples collected between November and January indicate serious contamination only at certain times. It is believed that heavy rains which took place on October 14 to 17, resulted in washing down an excessive amount of contaminating material, leading directly to the epidemic. The unreliability of analytical methods is pointed out.

Return Cases of Scarlet Fever.

"Those who are opposed to the treatment of scarlet fever in special institutions are always pointing to the comparatively large number of return cases of the disease which seems to be associated with isolation hospitals. The occurrence of such cases is very unsatisfactory, and when they are connected with small hospitals the medical officer of health or the medical superintendent frequently come in for criticism, and indeed, are often held responsible for circumstances which they cannot possibly control. This being so, any observations or investigations should be encouraged which are likely to throw light upon the cause of these return cases. For some years past, special inquiries have been made in Birmingham with respect to such cases, and since 1909, the inquiries have been entrusted to Dr. Shadick Higgins, the assistant medical officer of health. During this time swabs have been taken from the noses of certain of the infecting cases who were suffering from nasal discharge, suggestive of diphtheritic rhinitis. These swabs gave positive results so frequently, as to raise the question whether there might not be a connection between the presence of the Loeffler bacillus, and the recurrence of the return cases. For the elucidation of this point, swabs have been taken since December, 1910, from the nose and throat separately of the infecting case whenever a return case arose, as soon as possible after its occurrence, In a detailed and most interesting report on the whole subject Doctor Higgins has given the results of his investigations.

"During a period of about ten months, when 1,509 cases notified as scarlet fever were admitted to the isolation hospitals, there were 131 hospital return cases in the city. These 131 cases occurred in 89 houses, and three cases in three houses followed hospital isolation elsewhere than in Birmingham, one case coming from Coventry, another from Gloucester, and a third from St. John's New Brunswick. There were thus 86 houses with the infection of which the Birmingham hospitals may be considered to be concerned. As soon as possible after the notification of a return case, the primary cases were visited, and swabbed. In almost every case swabs were taken separately from the nose and throat, from the nose by rubbing the swab as far into both nasal cavities as the rigid swab holder would pass from the nostrils, and from the throat by well rubbing on and about the tonsils. Where there was ear discharge, a swab was taken from the ear. Out of 95 cases thus examined, there was a positive result from the nose only in 26 instances, from the throat only in two, and from the ear only in one instance. In two cases there was a positive swab from the nose and ear, and in six cases from the nose and throat. In the 85 houses from patients in which swabs were taken there was a positive result in 58 instances, and a negative in 27.

"Doctor Higgins prefaces his report by referring to the investigations of other observers as to the frequency of the presence of the diphtheria bacillus in the throats of normal persons. We have space only to mention the Massachusetts investigations, which involved the examination of over 4,000 persons. The throat and nose were examined in each case separately. In the case of 3,096 persons from communities practically free from diphtheria, mostly school children and inmates of institutions and hospitals, 1.4 per cent. of persons showed typical diphtheria bacilli, of which 0.9 per cent. had them in the nose, and 0.6 per cent. in the throat. Fifty-five of these positive cultures were tested, and five of them proved to be virulent. In the case of 1,154 persons, almost entirely children, in institutions where diphtheria had existed from one to eighteen months previously, the figures were higher, and it was found that 2.1 per cent. had the bacilli in the nose, and 1.5 per cent. in the throat. In this case, six of the positive cultures were found to be virulent.

"In his comments upon Doctor Higgins' report, Doctor Robertson, the medical officer of health of Birmingham, refers to the widespread prevalence of the germ of diphtheria, a fact which at first sight might tend to alarm the public. He points out, however, that many of the most dangerous germs are prevalent in the normal throat of a large number of people, and it would appear that when conditions are favorable, the organism becomes virulent and causes disease. We are glad to learn that Doctor Higgins is continuing his investigations with a view to elucidating the occurrence of the diphtheria germ so frequently in the throats of scarlet fever patients, and possibly thereby throwing some light on the occurrence of return cases of scarlet fever."

Medical Officer, February 1, 1913.

Chicago School for Study of Prevention of Accidents.

"There has been recently established in Chicago a school for the education of both employers and employees in the principles and methods of the prevention of occupational diseases and accidents. The school is in charge of the state factory inspector, whose duty it is, under the law, to see that health and safety devices are adopted.

"Beside a laboratory for the study of the causes of industrial accidents and diseases, there is a chemical laboratory, a model restroom, a model emergency hospital, a museum of pictures and exhibits showing safety devices and a drafting-room for the preparation of plans and specifications for machinery guards; these plans and specifications will be furnished free to manufacturers. There is also a free reference library of 4,000 volumes on factory inspection, occupational diseases and welfare work.

"The facilities and equipment of the school are to be supplemented by lectures to foremen, superintendents, and staff physicians of industrial plants and to social workers and others regarding occupational diseases and hazardous machinery.

"On the teaching staff of the school is a physician who has made a special study of occupational diseases in this country and abroad, an engineer who is an expert in the guarding of hazardous machinery and a corps of inspectors who are specializing in the problems involved in their work. Working men and women are also encouraged to visit the school and receive instructions in the way to protect themselves or to have examinations made in case they believe they are suffering from diseases due to their occupation, in which case conditions responsible for their troubles will be inquired into and corrected. The bulletins of the department of state factory inspection will be issued from this school and distributed to manufacturers, workers, and others."

The Public Health Journal, December, 1912.

Liability for Purity of Water.

"An interesting opinion as to the scope of the Illinois workmen's compensation law has been rendered by the secretary of the bureau charged with its enforcement. Responding to a query put by one of the liability insurance companies, he construes the law to mean that a workman who becomes ill from drinking contaminated water supplied at a plant for the employees while at work is entitled to compensation under the law. The opinion is, of course, merely an executive one, and before passing into the Illinois law will probably go through the courts, though it should be noted that the matter is not now the subject of litigation. The construction placed on the law by the secretary assumes, in the first place, that the word 'injury' used in the law covers illness and industrial diseases as well. As to those diseases which have been proved to result from definite industrial conditions or deleterious materials, there is no doubt that the spirit of present-day compensation laws aims to include them. The difficulty will come when the attempt is made to trace occasional diseases to a particular source—as to the water supply. Unless there is an epidemic clearly due to water, the connection between a given typhoid case, for example, and B. coli in a particular supply would be difficult to prove. The further interesting question then arises as to responsibility beyond the factory owner, provided his supply is obtained from a water company or from the municipality. Manifestly a claim that would lie against the manufacturer under the workmen's compensation law might not give him a valid claim for damages against the company or city, for manifestly entirely different legal factors are involved. If the matter should become the subject of litigation it will certainly present many interesting legal features and will, in addition, have important bearing on the scope of compensation acts."

Engineering Record, February 15, 1913.

How to Prevent Lead Poisoning.

The New York State Department of Labor is distributing among factory workmen a poster upon which are printed the following rules concerning the prevention of lead poisoning:

"(1) Always wash before eating and if you work in a factory before leaving the factory.* Remove all dirt from under your finger nails with a brush.

"(2) Never eat in the room in which you work.†

"(3) Never chew tobacco or gum while working. If you do, the lead dust on your fingers and in the air is sure to be swallowed.

"(4) Use overalls when you work. Do not wear your working clothes on the street or at home. They may contain lead and poison you and others.

"(5) Respirators are very useful and should always be used when working among lead dust and fumes.

"(6) Keep the workroom clean. Do all you can to keep down dust. Do not get lead on your hands and clothes any more than you can possibly help.

"(7) Always eat a good breakfast before going to work. Drink plenty of milk. Have at least one good movement of the bowels every day. Constipation is a suggestive symptom of lead poisoning. Avoid the use of intoxicants in any form. Their use weakens the body and makes it harder for your body to overcome the poison of lead.

"(8) Keep clean. Wash with warm water, soap, and nail brush. Take at least one full hot bath a week."

Such a practical, educational method should be very efficacious in eradicating one of the greatest causes of industrial disease.

The Social Diseases.

The November *Bulletin of the Massachusetts State Board of Health* contains an admirable contribution on "The Eradication of the Social Diseases in Large Cities," by Dr. R. N. Willson of Philadelphia. Perhaps the most interesting part of the paper is the section devoted to the consideration of measures to be avoided in combating prostitution and the social diseases. He considers the unprofitable attitudes and means of attack under three heads:

1. Indisposition, ignorance, inaction. These measures have been tried for centuries and the results speak loudly and positively.

2. Medical examination and segregation. These measures have been tried thoroughly in Europe and here and if anything have aided in the increase of prostitution and in the spread of venereal disease.

3. Vice Commissions. Doctor Willson believes that in the past these have been "at best a sorry attempt on the part of public officials, from the mayor of a city down, to shift a grave personal responsibility and duty on a long-suffering people."

In his consideration of preventive measures it is interesting to note that Doctor Willson recognizes the importance of economic maladjustment as a causative factor. On this subject he says that "starvation wages, the unattractiveness and poverty of the home, the opportunity of an easy income far larger than that obtainable in an honest or honorable livelihood . . . are the conditions that help, at least, in recruiting the ranks of the 300,000 and more of America's public women."

The Owen Bill in the Senate.

"The United States Senate on Monday, by a tie vote, refused to take up the consideration of the Owen bill. This does not finally dispose of the bill as it still retains its place on the Senate calendar and can be called up at any time and considered by a majority vote of those senators present. As it is realized by those friendly to public health legislation that there is little chance of the bill passing the House at the present session, the tie vote on the question of its consideration can justly be regarded with satisfaction by the friends of a broader national health organization. It is generally understood that Senator Owen will introduce a bill at the next session of Congress, if the present bill does not pass, but it is highly probable that such a bill will be redrafted and considerably modified. If this is the case it is to be hoped that Senator Owen will go back to the original plan and draft a bill calling for a Department of Health, with a secretary in the cabinet. The growing realization of the importance of this subject and the increasing support for it show the educational value of the agitation which has extended over the last three years. The opposition has reached its high-water mark, and the false statements which were so widely circulated regarding the object of the measure and the purposes of its advocates have reacted. The Owen bills have made people think. If they will only think hard enough and long enough to realize the great importance of health conservation, the eventual, inevitable result will be the establishment of a national Department of Health. Nothing short of this should be the aim of those who appreciate the present public health conditions and the needs of the future."

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*In factories the Labor Law requires employers to furnish washing facilities, including hot water and individual towels.

†The Labor Law forbids any worker to take food into any part of a factory, shop or working place where lead is present in "harmful quantities."

The Journal of the American Association, February 8, 1913.

The Ice Water Tank.

"After July 1, 1913, thirsty passengers on trains in Kansas will not be furnished with ice water unless the railroads supply a means of cooling the water without putting ice into the tanks. The old-fashioned ice water tank on passenger trains must go the way of the common drinking cup and the roller towel in Kansas, according to an edict issued recently by Dr. S. J. Crumbine, Secretary of the State Board of Health. Doctor Crumbine announces that he has had analysis made of the ice water on many Kansas trains during the last few months and in most cases he has found that the water is impure, owing to the method employed of putting impure or dirty ice into the tanks."

The Public Health Journal, December, 1912.

One Day of Rest in Seven.

The December Legislative Program (1912) of the American Association for Labor Legislation presents as its first plank in the Association's legislative platform that which is perhaps the most urgent of any of the several proposals, namely, "One day of rest in seven." The article defines (after the definition of the International Association for Labor Legislation) a continuous trade as one in which the work is carried on seven days a week and day and night for not less than thirty days in the year. The prevalence of seven days labor in the United States is indicated by the fact that 50,000 out of 173,000 employees in the iron and steel industry work seven days a week, most of them twelve hours a day.

In the state of Massachusetts alone there were 221,985 persons doing seven-day labor in 1907, while the number thus employed in Minnesota in 1910 was 98,558. The need for ameliatory legislation is urged not only from the standpoint of the protection of the individual worker, but there is also pointed out the social and economic necessity of conserving our human resources through the preservation of the worker as a group and through the prevention of much premature disease and many avoidable accidents, both resulting frequently from overfatigue.

The Sunday laws are declared to be not only obsolete, impractical and impossible of enforcement, but so shot with exceptions and full of loopholes as to be entirely useless. Such state legislation as there is up to the present time is shown to be abortive and fruitless, as is illustrated by the Massachusetts law, which is comprehensive enough in its scope, covering practically all industrial and commercial pursuits, but exempts "cases of emergency or at the request of the employee."

Finally, the report emphasizes the urgency for a uniform standard law, which shall recognize the necessity for continuous operation in certain industries but shall at the same time insist on non-continuous employment in those industries. The new law must provide for at least twenty-four consecutive hours of rest in the week, without regard to the day, for every person employed.

The Inspection of Hospitals.

"The Arkansas State Legislature will be asked to pass a law to provide for the inspection of all public or private hospitals, reformatory homes, houses of detention, convents, asylums, sectarian seminaries, schools or institutions, by the sheriff of the county in which such institutions are situated, or by the grand jury thereof, or by any person or persons appointed by a judge of a court of record, upon a petition signed by twenty citizens of said county, or by volition of the judge. Section 5 of the act provides that any officer, agent, employé or other person or persons, refusing to permit, or interfering in any manner with the inspection of such private or public hospital, reformatory home, house of detention, convent, asylum, sectarian seminary, school or institution, by the sheriff or the grand jury, or any person or persons duly appointed by the judge of a court of record, in accordance with the terms of this act, shall be deemed guilty of a misdemeanor and shall, upon conviction, be punished by a fine of not less than $300 and six months' imprisonment for the first offense, and for each additional offense not less than $500 and one year's imprisonment. Just what is back of this bill, or what has led to its presentation to the Arkansas lawmakers, *The Record* is not informed. Such a law might be of much value, or it might work injury, this all depending on the character and ability of those who may be appointed as inspectors. Under proper inspection, no reputable hospital would have cause for fear, and that class of lying-in places such as are a disgrace to a community would be, or at least could be, controlled. If the Arkansas Legislature passes the act, it will be of interest to watch its results."

International Hospital Record, January, 1913.

Reporting of Occupational Diseases.

The American Association for Labor Legislation has recently published a leaflet on this subject. The paper reviews briefly the symptoms of, and industries associated with, poisoning of lead, phosphorus, arsenic, brass, wood alcohol and mercury; discusses anthrax and compressed air illness, and emphasizes in the following way that uniform reporting of industrial diseases is the the most important of preventive measures:

"The prevalence of some of these diseases has been reported on by federal and state commissions, and by private investigators. Of the prevalence of others we know practically nothing. To remedy this ignorance eight states made a beginning by passing, in 1911 and 1912, laws requiring every physician treating cases of specified occupational ailments to send to the proper state authorities a record of each case with the essential facts concerning it. Of the New York law Commissioner Williams of that state says:

" 'This law has been in effect for a little more than a year, and we are beginning to find out what employments are surrounded by dangers that are almost invisible, but none the less terribly real and a menace to the persons engaged in such employments. The information that comes into our possession enables us to call direct attention to conditions in factories which threaten the health of the workers.' "

The Association is introducing into all the state legislatures a standard uniform bill dealing with this phase of the industrial problem.

Lead Poisoning in the United States.

Leaflet No. 9. of the American Association for Labor Legislation, in dealing with the lead poisoning evil in the United States, besides pointing out the comparative incompleteness of our records, shows further that the amount of plumbism in our country is alarmingly great.

"While foreign records of lead poisoning are based on an accurate system of compulsory reports, our investigators must rely on hospital and dispensary records (which commonly, cover not more than one case out of every four); on physicians' incomplete memoranda; and on the personal statement of a shifting, often foreign-speaking class of employees.

"But in the United States Bureau of

Labor *Bulletin, No. 95,* Doctor Hamilton reports 398 specific cases of lead poisoning among the workers (some 1400) in 22 of our 25 white lead plants, with 16 fatal cases between January 1, 1910, and April 30, 1911. In the same *Bulletin,* Doctor Andrews gives a list of 60 fatal cases of lead poisoning reported by physicians for the state of New York during 1909 and 1910. A hasty study of plumbism in New York City showed 376 cases during 1909, 1910, 1911. The Illinois Commission on Occupational Diseases credits 578 cases to that state during 1908, 1909, 1910. The United States Bureau of Labor, in *Bulletin 104,* reports for 1910–1911, Doctor Hamilton's discovery of 60 cases of lead poisoning among 796 men employed in 40 white ware potteries, and 43 cases among 150 women in the same works; 63 cases among 304 men employed in 18 yellow ware, art and utility ware and tile works, and 35 cases among 243 women in the same works; and 309 cases among the 1,012 men employed in the porcelain enameled iron sanitary ware factories. Out of 148 enamelers and millhands, specifically examined, 36 per cent. were found to be suffering from chronic lead poisoning."

The Prevention of Presenility.

"Old age is not only an important medical question, but a far more important economic problem, because old age carries with itself an incapacity which makes its victims charges on the public, or burdens and handicaps to some individual."

Thus an editorial in the *New York Medical Journal* (January 4, 1913) indicates the individual and social significance of the old age infirmities. The writer further points out, however, that it is not so important for us to attempt to combat old age, as to prevent the *premature* senility resulting from our strenuous civilization. The facts that employers recognize the inefficiency of old age and refuse to employ men past middle life in many instances, that the period of successful competition and efficiency is very short, compel men to try to crowd all the work they can into this period in order to live when their efficiency is impaired. Therefore, a vicious circle results, even though a less strenuous, slower, surer mode of living would be far more economical of life.

The prevention of the inevitable presenility following present modes of living is undoubtedly the adoption of the "simple life," but this is to be attained not so much by asking people to go more slowly as by encouraging regular periods of vacation, periodic relaxation, so as to give a chance for the anabolic processes. "Everyone should, in the language of the sea, be laid up occasionally to prevent too much wear and tear."

Home Work.

The December (1912) *Bulletin of the International Labor Office* contains the resolutions adopted by the International Association for Labor Legislation in Zürich, September, 1912. Of special interest are those resolutions relating to home workers, declared by the delegates to be existing under miserable conditions, caused especially by their absolutely insufficient wages.

To the end of finding means for raising wages for this class of workers the conference offered the following recommendations:—

1. The organization of home workers in trade unions and the conclusion of collective wage agreements with employers and employers' federations.

2. "The adoption by legislation of the principle that wage agreements for insufficient amounts or of an usurious nature should be null and void, and that the conclusion of such agreements should be subject to penalties."

3. Legislation should be founded on minimum rates fixed by wage boards.

4. All disputes should be settled by the wage boards.

5. The delegates are urged to introduce, or cause to be introduced into legislative bodies, bills corresponding to these resolutions.

6. "The national sections are requested to engage in an energetic campaign in order to convince the public of the necessity of fixing minimum wages for home industries."

Unusual Illness among Cotton Weavers.

"A report has recently been issued from the Home Office by Dr. Edgar L. Collis, one of His Majesty's medical inspectors of factories, which deserves more than passing reference. It is concerned with an outbreak of illness which occurred in three consecutive years among the weavers in a cotton mill at Colne in Lancashire, and in the last of the three years, 1912, in two weaving sheds in Burnley. The symptoms as described by Doctor Collis were dyspnœa with a sense of constriction of the chest beneath the sternum, then rapid and shallow breathing, with occasional deep sighs and a persistent cough with which was associated expectoration of thick yellow or yellowish green sputum and a sweetish taste in the mouth. Later the difficulty in breathing progressed until it resembled asthma, preventing sleep or arousing patients from a disturbed rest, fighting for breath and driving him to throw open the bedroom window for air. There was general malaise, aching limbs and back, severe headache and shivering ending in perspiration; occasionally there was a night temperature of 100 degrees F. to 102 degrees F. As the symptoms persisted, the patient could not hurry when walking, and on ordinary slopes found it difficult to climb; the appetite became affected and there was loss of weight. In a few cases herpetic eruptions on the face, palpitation, smarting and running of the eyes, and loss of the sense of smell occurred. There was no diarrhœa, jaundice, pigmentation of the skin or other symptoms of arsenical poisoning.

"Doctor Collis shows very clearly that these cases of illness must have been caused by a mould which formed on the cotton which was being manipulated. They occurred only in sheds in which cloth was woven for subsequent bleaching or dyeing. This cloth, it appears, cannot have applied to it any antiseptic containing chlorine, since dyers specify that no chlorides shall be present in the goods they purchase. The absence of an antiseptic enables mildew to grow on the warps, especially as the size with which the cotton is treated is composed for the most part of flour, tallow, china clay and water. The illnesses may have been caused by the inhalation of the spores of mildew or from inhaling certain injurious gases which are liberated in certain circumstances from mildew growths. In favor of the latter view are the facts that the symptoms appeared with great rapidity, for, when the operatives resumed work at Burnley after a fortnight's absence, several of them were seen to be suffering at eleven o'clock in the morning—an onset so rapid as to leave but little time for an incubation period. A definite smell was noticed on some of the cotton, and those operatives who worked near two exhaust fans, which would draw any gas towards them, placed in the roof, were more affected than those farther off. In order to prevent a recurrence of this form of illness, Doctor Collis speaks with approval of treating the sized cotton with formaldehyde as an antiseptic. His careful investigation into the whole question should prove of the greatest service to medical practitioners in the cotton districts."

The Medical Officer, February 8, 1913.

The Waste from Disease in Industry.

Dr. John Andrews, Secretary of the American Association for Labor Legislation, in speaking before the National Civic Federation in February, 1913, presented to that organization some interesting facts and figures concerning industrial disease and its prevention. He is quoted in the *New York Times* (February 7) as follows:

"In the last two years organizations and individuals coöperating throughout the country have achieved at least one notable triumph in procuring the enactment of legislation by the federal government prohibiting the use of phosphorus in the match-making industry in the old way with its inevitable consequences of phosphorus poisoning to the workers. The agitation also has come to include in its aims the establishment of special clinics and hospitals for the treatment of workers in the industries that bring on occupational diseases—the weaving industry, with its unregulated moisture in weaving sheds and drying houses, the hatter's industry, with its tremulous workers suffering from mercurial poisoning; the miners suffering from asthma in the dark damp of the mines; the workers in dusty and lint-filled shops, and the workers in compressed air in tunnels and at the foundations of bridges.

"In the building of the foundations of one bridge at St. Louis alone, it was found that of 600 men employed there, 119 were ill and fourteen died as a result of working in the compressed air. In the construction of the Pennsylvania tunnel in this city 3,400 men suffered from compressed air lungs. All this was absolutely preventable.

"There is only one law on the statute books in the United States looking to such prevention, however, and that is in New York. There are no less than twenty-seven trades in which workers are menaced by arsenic poisoning, and 138 trades in which the workers are in constant danger of lead poisoning. It is estimated that at least 13,000,000 cases of sickness each year among industrial workers result from occupational diseases, and a money loss of nearly $750,000,000 annually. Of this, it is believed, at least one fourth is absolutely preventable.

"Investigation of mercurial poisoning of workers in the United States developed the fact that physicians treating such cases were not sending reports thereof to the proper authorities, and that statistics on the subject could therefore not be kept. Mrs. Lindon W. Bates got a law passed in New York requiring physicians to report such cases, and since then eight other states have followed suit.

"There is crying need of general legislation requiring careless employers to instal safety devices and machinery to carry off dangerous dust and fumes in their factories. Illinois is the only state in the Union that has proper labor legislation at present.

"The logical thing would be to have workmen's compensation and insurance against industrial accidents and occupational diseases as well. There are, however, many obstacles in the way of that.

"In the first place there is a general apathy of the public, which can be and is being overcome by educational propaganda through just such meetings as this.

"Then there is the interested opposition to such legislation by some physicians who, thriving on large practice among workers in such dangerous occupations, so far forget their social obligations as to oppose the enactment of preventive or remedial legislation to shield the workers.

"In the third place there is the opposition of manufacturers, who fear that if they go to the expense of providing defensive machinery and methods in their factories, competitors less humane than they will be able to undercut them in the price of their product and thus undersell them.

"Finally, there are some manufacturers who threaten, if such legislation is passed in one state, to move forthwith into another where there are no such laws. These threats, however, are for the most part bluff, and can be made all the more ineffective by passing uniform labor laws in all the states at the same time."

Communication.

To the Editor.

Sir: I am undertaking an exhaustive research into the pathology, etiology and dietotherapy of diabetes mellitus. I am very anxious to hear from every physician in the United States who has a case under treatment, or who has had any experience in the treatment of this malady. Von Noorden says "the best treatment for the diabetic is the *food* containing the *greatest* amount of *starch* which the patient can bear without harm." If any physician who reads this has similar or contrary experience and would take the trouble to write me, I would esteem it a special privilege to hear from him, if only a postal card.

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ADDRESS OF THE CHAIRMAN OF THE MUNICIPAL HEALTH OFFICERS' SECTION.

JOSEPH S. NEFF, M.D., L.L.D., D.P.H.

Delivered before the Municipal Health Officers' Section, American Public Health Association, Washington, D. C., September, 1912.

The realization on my part of some of the shortcomings of a public health official and the needs of the present day in making his administration progressive, prompts me to dwell for a few moments, at the opening of this meeting, on certain problems presenting themselves to health officials and methods for securing greater efficiency in public health work.

The fact that organization for the conduct of health work along certain lines, in accordance with ancient theories of the spread of contagion, has existed for years, is no reason for continuing the same, when, in the light of present day knowledge, it is evident that energy and appropriations are wasted by adhering to the old methods.

Most of us do not believe in the advanced views of a few concerning the uselessness of terminal disinfection, yet do we not find that considerable time and means have been wasted in appeasing the popular desire for certain kinds of disinfection, when both money and energy could have been spent to better advantage in other ways?

Obsolete building and drainage laws are in force in many cities, without change since the time, not so long ago, when typhoid fever, diphtheria, scarlet fever and most infectious diseases were supposed to emanate from imperfect sewer connections in the homes. House drainage, of course, should be sanitary, but much unnecessary expense in this work, at the present day, could be saved, and the money more effectually used in improving general housing conditions, the most important factor of which is in connection with air space, ventilation and light, and even rat-proofing may become necessary in view of bubonic plague having become pandemic.

We confine ourselves too much to the strictly medical side of municipal health work. If we are to keep abreast of the times, we must realize the full importance that social service, eugenics and euthenics play in lessening the death rate.

We know that many preventable deaths are due to disease contracted on account of lowered vital resistance through occupation; to the evil of employment of immature children to satiate the greed for wealth; to improper care of female operators; to working in insanitary buildings; in addition to the so-called "hazardous" occupations, improper housing conditions, and to alcoholism and poverty, all tending to make a sub-normal people and high death rate.

The effort of the public health official should be to meet conditions as they exist. We know how much more can be accomplished by bending our energies to prevention than simply to the proper care of the individual after he has broken down; after he has become insane; after he has contracted disease or after he has become incapacitated to support himself. A municipal health officer must ally himself with social forces and philanthropic associations working along the same lines to protect women and children in their employment; to improve general housing conditions in the home as well as in the mill and factory by obtaining proper legislative power, which, if obtained, will be of little value without education of both employer and employee; to properly segregate and care for mental defectives especially women during the childbearing period, thereby cutting down their abnormal progeny; to prevent improper marriages; and to aid in sensible organization against the abuse of alcohol.

There is yet another shortcoming on the part of some of us whose lines of work are in large cities, where large numbers of inspectors and nurses are employed, in not paying sufficient attention to their general education and training in hygiene and sanitation, to make them an appreciable aid in the all-important education of the general public, for without such knowledge themselves, it is obviously impossible for them to impart it to others. Systematic lectures to corps of inspectors and nurses are valuable, but a better method of increasing efficiency is to require, at intervals, written papers on subjects pertaining to their particular line of work, a careful analysis of which will show individual deficiencies. Information obtained thereby will also be a valuable guide to the lecturer in shaping his lectures to cover the necessary ground, and a friendly rivalry will be instituted, which is always a stimulus to a good employee. Helpful rivalry can be increased by giving the inspectors rating on this educational work. In other words, maintain a school of instruction, and the laggards who will not endeavor to raise their school standing will soon be discovered and replaced by others who will increase the efficiency of the entire corps.

A visiting nurse is of much value in instructing the mother in the care of her baby and in administering to the sick, but to prove of most value in municipal health work she must also be educated along lines not covered in the ordinary training school for nurses. To prevent the spread of contagious diseases, she must first have a working knowledge of all the factors, medical and sociological, which enter into the problem. To be of service in the work of increasing vital resistance, she must have knowledge of the causes which lower it. This knowledge must be along lines of elementary bacteriology, hygiene, sanitation, preventive medicine, and medical sociology, to accomplish which, a school of instruction must be maintained. The man, who is, as a rule, the wage earner of the family, is away from home and pays little attention to domestic life; consequently, it is the housewife who comes in contact with the municipal inspector. A graduate female nurse, carefully instructed, therefore becomes a better sanitary instructor than a man, and since ignorance is the greatest barrier to all sanitary progress, the highest standard of efficiency, assuring the best results, can be reached only by entering the sanctity of the home, by one of the mother's own sex, who is able to speak her language and whose sympathy, kindness and knowledge gain her confidence.

In Philadelphia the accomplishments of the visiting municipal nurse have already been published, showing a lowered infant mortality, and also lowered morbidity and general mortality, especially in the contagious and preventable diseases. Districts where similar conditions prevailed were selected, a careful study made and statistics prepared of the district in which the nurse worked and the district in which she did not. Similar studies were made regarding the efficiency of the school nurse in procuring the removal of physical defects in school children. In schools under medical inspection, without the nurse, only 15 per cent. of defects were remedied, while in schools under similar medical inspection, with the nurse, 85 per cent. were remedied, due to the follow-up visits to the homes of the children by the nurse.

Woman, in public health work, has come to stay, and the health officer who does not realize this and ignores social service work, and who does not strive continually to increase the efficiency of his employees by education will not keep abreast of the times in the present state of awakened public interest and progressivism.

THE NEGRO: HIS RELATION TO PUBLIC HEALTH IN THE SOUTH.

C. E. Terry, M. D.,
Jacksonville, Fla.

Read before the Municipal Health Officers' Section, American Public Health Association, Washington, D. C., September, 1912.

It is not without considerable hesitation, that I have undertaken to touch upon certain aspects of a question, which has presented so many difficulties to the minds of sanitarians of far greater experience and ability than myself. Indeed, it is doubtful if I should have, voluntarily, placed myself in the position of presenting a paper to this Association, wherein the query stands forth so much more prominently than the reply, were it not that I realize, daily, in my departmental work, that whatever means of success may attend the efforts at health conservation in the South, must result from work especially directed towards the negro element of our population.

I shall attempt no general consideration of the "negro problem," its social and economic bearings to our growth and development, nor risk a single prophecy as to its probable solution. There are, however, certain conditions in our Southern cities, created by this race, which call for most earnest consideration in the conducting of the work of municipal health departments. The difficulties encountered exist in direct ratio to the percentage of the negro to the total population. In Jacksonville the census of 1910 shows our population to be 51.1 per cent. negroes, and I feel that we furnish an ideal example of the problem as affecting health conditions.

That the influence of the negro has a material and vitiating effect on the progress of any community in public health matters, there can be no denial. The well-known high mortality of the race is alone sufficient evidence to the truth of this assertion. The increase in the total death rate of our cities, through the excessive negro mortality, exerts a definite, harmful influence upon our growth and leads those, unacquainted with the facts, to erroneous impressions as to our sanitary standing. However rapid as has been the growth of many of our Southern cities during the past decade, through immigration from the North and West, I am convinced that, but for this deterring factor, it would have been still more rapid. This alone, however, is not worthy of more than passing consideration, in that it affects but the financial aspect of the subject. Of far greater import is, I believe, the direct influence of the negro race as a menace to our own—a source and disseminator of infection.

It may be of interest to note the principle causes of the excessive negro mortality, both direct and indirect before discussing the problem of race infection. The figures here presented cover, for the most part, the four years, 1908 to 1911 inclusive. While they do not extend over a period of sufficient length to warrant absolute deductions, yet the annual fluctuations are fairly well eliminated and they may safely be taken as indicative of conditions existing in Jacksonville.

During the past ten years the negro percentage of the city's population has been steadily decreasing, from 57.2 per cent. in 1900 to 51.1 per cent. in 1910. This decrease has been due in part to the great increase from white immigration, but also, to the higher mortality rate among the negroes. Their average mortality for the four years, 1908–1911 being 23.2 per thousand against 15.2 for the whites, an excess of 8. per thousand. Together with this higher death rate, have they shown a lower birth rate 16.79 for the negroes and 17.85 for the whites. While the white birth rate exceeds the death rate by 2.62 per thousand, the negro death rate exceeds the birth rate by 6.61 per thousand, in spite of the supposedly greater fecundity of the negro race. If, however, the stillbirths are added to the birth rates of both races, this natural fecundity becomes apparent with a total rate of 21.91 for the negroes against 19.26 for the whites. This naturally leads to the conclusion that congenital debility plays an important part in the decrease in our colored population, and, while I doubt not that this be true, yet, I believe that another important factor enters in this consideration, namely the practice of midwifery in the South.

During 1910 and 1911 the stillbirths constituted 17.52 per cent. of all negro births against 7. 49 per cent. of white births. For the same two years 51.7 per cent. of all births were attended by negro midwives and 48.3 per cent. by physicians. The stillbirth rate in the physicians' practice was 8.69, in the midwives' practice 16.11, nearly twice as high. This toll falls heaviest upon the negro babies, as they are nearly all attended at birth by midwives.

It would be a well-nigh impossible task to estimate correctly the percentage of stillbirths attributable to ignorant midwifery, although personal contact with the type of women filling this important function, would serve to convince any of you of their potency as factors in stillbearing. They belong, usually, to the most ignorant type of negroes; too lazy or incapable to support themselves in any other manner; many too ignorant to fill out a birth certificate and all without the knowledge of, even, the rudiments of obstetrics or the necessity for cleanliness in the execution of their duties.

During the period in question, 1908–1911, thirteen cases of tetanus neonatorum have occurred in the practice of these women; one where the birth was attended by a physician.

How many cases of fatal infection of mothers have occurred, I am unable to say, as a diagnosis of such cases in their practice, is practically never made. They possess the utmost confidence in their own ability and regard whatever fate befalls the mother or child an inevitable interpretation of Divine intention. They recognize no situation as deserving of skilled intervention and I have yet to learn of the first call, from a midwife, for the assistance of a physician.

There is, in Jacksonville, no midwifery law, though a review of the conditions, as I have portrayed them, would seem to indicate a crying need for such legislation. I am frank to admit that for two years I have endeavored to frame a city ordinance which would meet the requirements in the case, and today I am as far from a solution as when first my attention was called to its necessity.

To require the most simple evidence of the understanding of their calling, would at once disbar them all from practice. This is a well-considered statement, I am personally acquainted with every midwife in the city.

Furthermore, as already stated, more than one half of all births are attended by midwives and the large majority of patients can afford no better service. Gratuitous attendance of medical men is too much to ask and I feel that, in its absence, it would be inhuman to deny, to women in labor, the comfort of the services of these women, however great their inefficiency.

In the consideration of the excessive negro death rate, we note a variety of facts, some of which are apparently contradictory and all of which present to the sanitarian problems of great difficulty.

The following table compares the death rate of the two races from certain causes.

WHITE AND NEGRO MORTALITY FROM CERTAIN CAUSES COMPARED.

Cause of death.	Number of deaths.							
	1908.		1909.		1910.		1911.	
	W.	C.	W.	C.	W.	C.	W.	C.
Typhoid	20	25	20	23	31	16	18	8
Malaria	5	18	7	28	2	29	6	35
Measles	1	0	0	1	0	0	6	3
Scarlet Fever	0	0	0	0	2	0	4	0
Whooping Cough	3	6	0	9	0	5	2	0
Diphtheria	2	0	3	0	1	1	4	2
Influenza	1	6	2	3	0	4	3	8
Tuberculosis (lungs)	53	142	40	111	19	95	48	100
Tuberculosis (other causes)	2	2	10	4	3	3	10	8
Venereal Diseases	5	12	2	24	0	9	7	32
Pneumonia	28	57	34	44	24	57	23	43
Diarrhoea, under two	9	11	9	6	13	36	28	43
Diarrhoea, over two	25	24	24	27	5	7	8	15
Congenital Debility	11	17	17	43	14	14	16	41
Total	165	320	168	323	114	276	183	338

Tuberculosis and other diseases of the respiratory system lead, as factors in this disproportionate mortality, while venereal diseases and congenital debility are markedly evident as causes. What part is played by inherent racial weakness can only be conjectured and, in apparent refutation of this as a factor of moment, we see that typhoid fever and the acute contagions of childhood show more white than colored deaths. It is probable that the negro deaths from these diseases would be increased were more accurate diagnoses available.

Here enters another factor which, I feel must be accorded an important place, as a cause of the high negro death rate. Reference to the death certificates shows that, during the four years 1908–1911 of all the negro deaths (exclusive of violent deaths and suicides), 16.60 per cent. occurred without medical attendance, while of the white dying during this period, only 5.25 per cent. were unattended by a physician. In justice to the efficacy of modern medicine, as a factor in longevity, we are forced to assume that a portion at least, of these deaths, might have been prevented, had a physician been in attendance. Added to this total absence of treatment in nearly 17 per cent. of the negro deaths, must be considered the large number of cases receiving scarcely better service, attended as so many are, by ignorant physicians of their own race and the less well-equipped members of the white fraternity. Here, again, the evil of the midwife or "Granny" are due notice. These women, for the most part old and infirm and as wholly ignorant of the requirements of their avocation as they are devoid of responsibility and honesty of purpose, delight to force their way to the sick beds of their people and ply them with worthless concoctions, entirely contented if, by hook or crook, they are able to prevent the calling of a physician. They play, successfully, upon the superstitions of their race and before even the more intelligent see the gravity of the situation and summon a physician, the time for hope of successful intervention is, too often, past.

We meet, here, one of the many contradictions in the mental equipment of the negro. An alarmist by nature, where trifles are concerned, yet, in the presence of a truly grave condition, even with death at hand, his natural optimism prevents all foresight of a possible fatal termination.

Here, the health department of the Southern city is confronted with a most serious problem and one which requires, as much, if not more, than any other, an early solution.

Admitting that racial weakness will account for a percentage of the negro death rate, above our own, and that occupations and surroundings inferior, from a sanitary point of view, must always add their quota, yet we are brought, daily, face to face with this situation, a large percentage of our population, in Jacksonville 50 per cent. are, when afflicted with disease, most inadequately supplied with efficient medical attention.

I have touched upon the part played by racial temperament and superstition and by that operating at birth, through ignorant midwifery. To this must be added that, due to poverty, rarely will a negro physician visit one of his own race a second time without remuneration and yet the increase in the number of negro doctors has, in large measure, tended to convince the white physician that his responsibility has been lifted from him.

The full gravity of the situation is apparent when we see that the preventable causes alone, shown in the forgoing table (exclusive of congenital debility), comprise 42.5 per cent. of all the negro deaths as against 32.1 per cent. of the white deaths.

These figures represent those deaths from communicable diseases where a diagnosis of some kind was made, where at least one visit had been paid by a physician, but it does not clearly indicate, as I would call to your attention, that the large part of these cases were not so treated as to, in any appreciable degree, lessen their danger as foci of infection; nor does it include many cases of communicable diseases classed as "unknown and ill-defined," the public dump for the unattended. (This classification comprises, for the four years under consideration .71 per cent. of negro deaths as against .38 per cent. of whites.)

This condition of affairs affects the death rate of the Southern city in two ways: it adds to the naturally high negro mortality and it unquestionably increases the white death rate by direct infection of our own people, a race infection.

These negro citizens, amongst whom we find such an undue prevalence of diarrhœal diseases, tuberculosis and venereal infections, who live under the worst of sanitary conditions, through circumstances, racial inferiority and our neglect, mingle with us in a hundred intimate ways, in our stores and factories, our kitchens and nurseries. They knead our bread and rock our babies to sleep in their arms, dress them, fondle them and kiss them; can anyone doubt that we may not escape this close exposure?

The missed and carrier cases of typhoid and other intestinal diseases that wait upon our tables must exact their toll nor is this lessened by any habits of personal cleanliness discernable.

Here, certainly, it would seem, is a field for new endeavor in modern sanitation. Aside from humanitarianism, are we confronted with the problem of self-protection, but as, in matters concerning public health, protection of others is a concomitant of self-protection, we may see a double result of labor expended. I have been struck with the views of Doctor Levy as expressed in his annual report for 1911, where, in speaking of this excessive negro death rate, he calls attention to how little has been done toward investigating its underlying causes, and suggests a closer study of the subject than has been, heretofore, accorded it. Indeed, if we of the

South may hope to vie with our Northern confrères in health conservation, we must devote more time and effort and influence the opinion of our thinking public to the end of bettering these conditions. I feel with Doctor Levy that much money has been expended in adding to the literary accomplishments of this race which would have found a more profitable field had it been devoted to bettering their housing, hospital facilities, medical inspection and attendance.

Actuated by the belief in the great need of this portion of our people of education in health matters, as well as in the advantages to be derived from a closer, intelligent supervision of their living, I organized, during the past year, a Colored Health Improvement Association, having for its object the lowering of negro mortality from preventable disease. An appeal to the more intelligent negroes found ready response and, as a beginning, I suggested the employment of a well-trained colored nurse, for district work under the supervision of the Health Department. My contingent fund could not stand the expense of her salary for the eight months remaining of the year, so I asked those interested to subscribe the funds. This they have done and left her selection and direction entirely in my hands.

She has done most excellent work, visiting, watching and instructing only cases of communicable disease. She is well received and through her, aside from the direct assistance where a physician was already in attendance, a large number of the poorer class have received competent medical attention, who, but for her efforts, would have passed through the course of their maladies unassisted.

It is a small beginning but fraught, I believe, with possibilities for good and it has been the means of carrying to many their first lesson in preventive medicine.

This race, so recently removed from savagery, is by nature imitative, a characteristic which may be used to advantage in their sanitary education. They are, however, suspicious of our own race, with how much reason I leave to the sociologist, and they will, in many instances, receive instruction and assistance more readily from one of their own color. It is, I feel, quite essential that this district work be done by colored nurses in the far South, where race distinction is, of necessity, so much more clearly defined than in some other sections of the country. No white man or woman may ever hope to obtain a clear insight into the negro point of view and an intelligent colored instructor will carry conviction where a white one would fail utterly.

Their innate suspicion of our motives makes them reluctant to accept even medical treatment from a white city physician, and the colored nurse is of material assistance in overcoming this feeling as well as in her work of following up his cases, interpreting his instructions and insisting that the latter be carried out. Aside from the management of the sick, a problem fully as great confronts us, the regulation of the well. It reopens the question of the sanitary inspector and I see no better solution, when due regard is paid to essentials. It must be remembered that for generations we have left this race to their own devices in their homes. They live for the most part in ill-ventilated shacks, without provision for sewerage or proper water supply, the privy, the surface well, the rain barrel and filthy stable are evidences of our own shortsightedness and their needs. Time alone may change their surroundings and, for the present at least, a constant supervision of the maintenance of these places is required to ensure, even, a reasonable immunity from their dangers.

Where mosquito extermination requires a constant activity on the part of the municipal health department; where surface privies exist in dangerous numbers and where climatic conditions augment the menace of insect-born disease, as in many of our Southern states, the sanitary inspector performs a duty not required in other sections of the country, and, but for his watchfulness, the carelessness and ignorance of the negroes would inevitably present an even greater problem.

In conclusion, I need hardly say that I have but touched upon some points of an immense question. I have endeavored to present a few facts pertinent to my own field of labor. How nearly they describe the conditions in other Southern cities I can not say. I feel, however, that the negro in the South presents a field most barren of sanitary achievements and one deserving of new and better methods of solution. The immense amount of misdirected charity, which has been practiced upon this people, has served but to indicate its folly, and the whole South is today paying the penalty, not only of its own neglect, which has been great, but of the misconceptions of distant philanthropists as to the negro's greatest needs.

DISCUSSION.

Mr. J. S. MacNutt, *Orange:*

Will Doctor Terry give us some idea of the relative rate of increase of the white and colored races?

Dr. L. L. Lumsden, *U. S. P. H. Service:*

I really feel, after listening to such an excellent paper on a subject of such tremendous importance, that we should not permit it to pass without discussion. I have had an opportunity to see a good deal of the negro problem in its sanitary aspects in the South. We have here in Washington a problem which is very much complicated by the large proportion of negroes, and, of course, the ignorant class of negroes, in the population. Practically every Southern town and city which I have visited is confronted with this immense problem. When we begin to recommend the extension of sewerage systems or the installation of sanitary privies in every home in these cities, we realize that it is almost out of the question, in some instances, to provide a home that is not worth more than probably fifty or sixty dollars with sewage connections which will cost as much as the home is worth. Now, we find in most of our Southern towns a large number of such buildings. Usually, the sections occupied by the whites are framed with a negro settlement, sometimes covering a larger territory than that occupied by business places and by the white residences. I believe that no residence is fit for human habitation that is not worth being connected with a sewer where a sewer is available. I believe that no section of a city should be permitted to exist which is not reached by a sewerage system, if any part of the city is reached by a sewerage system. In other words, I believe that one thing that should be given very serious consideration is a rigidly enforced building ordinance. Now, in many instances, the majority of the negroes living in the cities in these crowded sections would be better off if they were not permitted to live in the city, and the other residents of the city would be better off if the negroes were compelled, by rigid building ordinances, to move away. Now, this may seem harsh in its enforcement, but I believe it is one way of approaching this tremendous problem. In Washington, our capital city, we have a number of crowded alleys and courts and sections around the outlying edges of the city proper, in which negroes live under most pitiable sanitary conditions. Now these negroes would be better off if they went out into the country. I do not pretend that they would live under better sanitary conditions in the country than where they are, but the trouble would be more diluted, at least, if they were disseminated in the rural sections. These insanitary conditions have a most important bearing, and I believe that most of us that work on typhoid problems have found the remarkable fact that typhoid fever is usually less prevalent among the negroes than the whites, as far as we can determine the prevalence of the disease from the reports of cases; but it seems very probable to me that there is much more typhoid among the negroes (who in only a small proportion of cases have competent medical attendance) than the actual reported rate is. We find that the mortality from typhoid fever is usually much higher among the negroes than among the whites, in Washington; we have seen that there is a marked difference in the seasonal prevalence of typhoid affecting the negroes. The negroes compose about a third of the population of the District of Columbia; they furnish something life 26 per cent. of our cases occurring throughout the year, but in the summer we find that the negroes compose usually about 40 per cent. of our actual reported cases of typhoid, showing that (though the disease the year round, appears to be less prevalent among the negroes) in the summer the percentage goes up. I have very much enjoyed listening to Doctor Terry's paper.

Dr. Woods Hutchinson, *New York:*

I think that Doctor Terry has brought up a very important and interesting question here. There are regions in every city, North and South, that we do not exhibit to the casual visitor if we can help it. There are regions where 40 per cent to 60 per cent of the community live which are not the show parts of the town by any means, but the conditions Doctor Terry has brought out in regard to the negro have this additional complication, that the negro is not allowed to live anywhere outside of those insanitary regions, and the health officers of Southern towns, where the negro section is in such distressing condition, will tell you that the property owners of that section are white men who oppose the improvement of the streets and the laying of sewers and who refuse to improve their property because, for a shack costing $150 they can get $10 or $12 a month rent. That is not peculiar to the negro or to the South. We find it all over the country, and it is an illustration of the extent to which our greater respect for property than for human life has led the community. The only solution is for the city to take the matter in hand and provide good tenements and good living conditions and good sections of town, instead of letting the real estate speculator reap all the profit he can from those who are not able to pay the higher class rent. I believe that this question is simply an aggravated form of the problem of housing which confronts us all over the United States. It is complicated in the case of the negro by that unfortunate feeling that the negro is not wanted in the more desirable parts of the town. In one city in which I was, in the South, a very intelligent negro physician had built himself a house and moved into a street outside of the negro quarter, and received letters threatening his life, but the white citizens rallied to his defense and urged him to stay and he did stay. The support of the better class of the community is necessary in order to bring about well-drained and sanitary condition of the negro quarters, and I believe that, if Doctor Terry's paper will be the means of calling public attention to this matter and urging the municipalities of the South to take this step in advance, it will make an immense improvement in sanitary conditions and in healthfulness and in justice.

Dr. Hills Cole, *New York.:*

With regard to the midwifery problem, it seems to me that we have got to look on that as a matter of education. We cannot do away with the midwife under such conditions as Doctor Terry has outlined, any more than in any of our large cities, we must proceed on the lines laid down probably by Doctor Jacobi in his address to the American Medical Association, in which he said we have got to educate our midwives. If Doctor Terry could see his way clear to get hold of some decent colored women and train them in the first principles of midwifery, he would be taking the first step toward improving the conditions that he has reported in his community, because I believe that colored women will gladly avail themselves of the services of the woman who has the education.

Dr. H. J. Ball, *New York:*

It is not all a matter between negroes and whites. In the city from which I come, we have only three or four negroes in the city, but we have just the same conditions with Italians or Russians that you have with negroes in the South. The white man finds that there is more money in erecting a poor shack at a small price and renting it to Italians or Russians than in building a substantial house, just as the white man in the South has found in the case of the negro, and we need the nurse or midwife who can speak the language of these people and assist them in their troubles, to take charge of them. My experience is that they are just as dirty and unclean as the negro.

Doctor Delamater, *Kansas City:*

In Kansas City, a city of 365,000, we have about 30,000 negroes, and in that city, we have the unique distinction of having a board of public welfare, who work in connection and conjunction with the board of health. In a certain section of the city we have a population of about 5,000 negroes. This is the worst section of the city, and yet this year we have done a great deal of good by having two colored nurses and two colored physicians, high-class physicians, go into that section and instruct the parents and the people how to live. We have an ordinance in Kansas City that says to the Health department, "You can condemn any building that is unfit for habitation." When the board of public welfare and board of health get together and find a house unfit for habitation, we put a sign up on that house—"This building is condemned, unfit for habitation." There is a penalty of $100. It makes no difference whether the owner of the building is a politician or a multimillionaire, the board of health is out of politics and can do as they please in Kansas City. We had the unique distinction this year, and in fact other years, of having a very low percentage of midwifery. We have eight midwives in the city, and out of a birth rate of 4,072, we had 331 delivered by midwives. Doctor Terry, I believe spoke about educating the negro in midwifery. About a month ago, I had the pleasure of having a negro woman, rather intelligent too, come to me and made an application for permission to practice midwifery. In going over the questions—and the board of health does not accept the State Board of Health's certificate that a midwife is competent until she has passed the examination of the city board—I asked her some questions as to ophthalmia neonatorum and she was ignorant on the subject, and I said "before you can take out your permit for midwifery, you must know these points and I advise you to go to a competent negro physician and take a course under him before you come to me again." I referred her to one of the negro physicians of the city, who, I knew, could give her that information. The death rate in Kansas City among the negroes is increasing, but the birth rateis decreasing, and that, I am sorry to say, is probably due to hygienic conditions and also to the fact that they are getting on the white people's tricks, in other words, they are getting rid of their children before the time, so that, unless these hygienic and sanitary conditions are brought up to a higher standard, the negro problem will solve itself. That is the condition we find in Kansas City. The department of health there has taken up the matter of the education of the negro. We are getting them out of that quarter where they are existing today and into homes where they have sewer connections and where there is plenty of sunlight. I think the paper of Doctor Terry has brought out some very good points which other cities could take into consideration.

Doctor Saunders, *Alabama:*

I am glad to see that the gentlemen who are living in Northern cities sympathize with those of us who live in the South as to this question. It is the mortality among the blacks of the South that runs our mortality rate in the South so high.

Attention has been called to the importance of education, and particularly the education of midwives. Now in my state, Alabama, we have 3,000 colored midwives, probably more; and in my official work, which has extended now over some years, I have occasion from time to time to assemble the midwives of a county—and there is no class of people with whom I come in contact that are more willing to learn, more willing to be instructed, than they are. You can talk to them by the hour and they will give you the very closest attention and when you have finished, they will thank you personally over and over again.

My friend from Kansas City struck another keynote when he called attention to the importance of passing an ordinance that gives the health authorities a right to condemn any and every house that is not in a habitable condition.

Doctor Terry: *Jacksonville Fa:*

I believe a question was asked relating to the relative increase of negroes and whites. I stated in my paper that, including the stillbirths, the negro birth rate was greater than the white, but excluding the stillbirths, the actual birth rate among the negroes was not only lower than the white birth rate, but lower by six or eight points than the negro death rate; whereas, the white birth rate is higher than the negro birth rate. As to the reporting of births by the negro midwives, I believe that the percentage of births reported by those women is just as great if not greater than the percentage reported in the practice of physicians. They are terrified at the idea of being arrested, and I have made it quite plain to them that if they did not report births they would be prosecuted in the municipal courts. Furthermore, I have at Jacksonville sixteen sanitary inspectors to a population of about sixty thousand people, and every time that they make their rounds in every house they inquire as to recent births and bring in to me daily two or three or four addresses where new born babies have been found that have not been reported by either the physician or midwife, and in most instances the physicians are to blame rather than the midwives.

As to the condemning of houses as unfit for habitation, we have a similar law and the board of health finds no difficulty in this connection, but it must be remembered that if we condemn every house that is unfit for habitation in Jacksonville, we would condemn 33 per cent. of all of our houses, and that 90 per cent. of these are occupied by negroes. Now a house not connected with a sewer and city water supply would be admitted by most to be unfit for habitation, but our sewerage system does not cover more than two-thirds of our population at the most. It covers more than two thirds of the city in area, but not more than two thirds in population, because in the negro district, where the open privy (now screened but still a privy) is in use, the number of families residing to a block far exceeds those residing in the sewered district where property is more valuable and the inhabitants are for the most part white. As soon as we discover any house in a sewered district not connected with a sewer, we condemn it, but we cannot touch the non-sewered district by any such method.

As for the teaching of these midwives, I suppose that is the only hope for the future. I have asked them about ophthalmia neonatorum and have tried to explain the necessity of cleanliness in their duties and have always found them willing listeners. The negro is always a willing listener, says "yas sir, yas sir," and listens by the hour. You can talk all day, but when she goes back to her next confinement case, she will pursue the same methods she has practised since she started. If the negro midwife is to be educated, she must be educated in a training school for nurses. I do not believe that you can take the ignorant colored mammy, who cannot write her name, or make out a birth certificate (I make out many of them for these women from the data they bring me and sign them myself) and teach her the necessity for cleanliness in the practice of midwifery. Many of these women are old and infirm. They are too old to learn, and they get fifty cents, one dollar, one dollar and fifty cents, and may be more—but very unlikely more for their services in any individual case and it would be impossible to obtain the services of trained nurses as midwives for that recompense. I admit frankly that the problem of educating them is beyond me.

THE CLASSIFICATION OF HEALTH-BOARD EXPENDITURES.

M. N. Baker,

President of the Board of Health of Montclair, N. J., and Editor of Engineering News, New York City.

Read before Municipal Health Officers' Section, American Public Health Association, Washington, D. C. September, 1912.

Eighteen years' experience as a member of a local board of health and the examination of thousands of health board and other municipal reports have impressed upon me the need for a systematic classification of municipal expenditures in the public health and in other departmental fields. Such classifications are essential to the annual budget, or the estimate of expenditures for the coming year. They are also essential to an intelligent study of the efficiency of the work of a health board and of the relative values of different branches of that work. To be of greatest value, classifications of expenditure should be uniform from year to year in a given city and in cities throughout the country. Otherwise comparisons cannot be made of one year with another nor of one city with another.

Assuming that it is unnecessary to argue these points before such a group of men as compose the Health Officers' Section of the American Public Health Association I will pass on to a brief consideration of what should be the basis for a uniform classification of health-board expenditures. In view of the facts that (1) the funds available for health boards are universally scanty in comparison with their needs; (2) that the primary task of a board of health is to preserve the public health; and (3) that, the country over, a large percentage of health-board appropriations is being spent for objects only remotely connected with the public health, I have, after considerable thought, divided all health-board expenditures into two main classes, with a third class added to take care of expenditures which cannot be grouped under the two leading heads. The two main classes are expenditures for (I) Direct and (II) Indirect, Remote or Questionable Health-Protective Work while (III), as might be surmised, is called General. Sub-divisions under the three main heads have been made but these have not been carried out much further than to indicate what may be considered, in the light of present knowledge, as direct and what as indirect or remote health-protective work.

I do not propose to weary you with the details of my classification, which are shown in an appendix to this paper. My present object is to urge that to be most illuminating any classification of health expenditures should be functional, and that every expenditure, actual or proposed, should be carefully scrutinized to determine whether it is for an object which will be of direct or only of indirect or perhaps of questionable health-protective value. My opinion is that when so scrutinized and classified it would be found that a large part of the expenditures, and therefore of the endeavors, of many of our boards of health are devoted to what I have classed as municipal and private cleansing, and therefore should be relegated to other municipal departments.

Opposed to or contrasted with public and private cleansing and ranking first in direct health-protective work I have put the suppression of communicable diseases and the reduction of infant mortality. These I conceive to be, at least for the present, the chief duties of boards of health, both because of their supreme importance and because it is here alone that the return for health expenditures can in any appreciable and certain degree be measured in terms of vital statistics. Some years hence, more attention than is now feasible may be given to what I have called general health building and maintenance, which I have also classed as direct health-protective work.

Finally, I have made this paper brief, in order that some of the time accorded to me might be more usefully employed by others in discussion.*

FUNCTIONAL CLASSIFICATION OF HEALTH BOARD EXPENDITURES SUGGESTED BY M. N. BAKER, AUGUST, 1911.

I. Direct Health-Protective Work.
    (1) Prevention and Control of Communicable Diseases.
        (a) Laboratory
        (b) Notification and Investigation
        (c) Immunication
        (d) Isolation in Home
        (e) Hospitalization
        (f) Disinfection
        (g) Medical School Inspection—for Communicable Diseases
        (h) Records
        (i) Educational
    (2) Reduction in Infant Mortality.
        (a) Medical
        (b) Nursing
        (c) Supplying Milk, etc.
        (d) Records
        (e) Educational
    (3) General Health-Building and Maintenance.
        (a) Laboratory
        (b) Physical and Medical Inspection of School Children
        (c) Housing Control
        (d) Factory Inspection

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*The first steps in working out the classification appended to this paper were taken in behalf of the Board of Health of Montclair, N. J. Those steps were few and short. The major part of the work of classification was the outcome of a request from Dr. Charles V. Chapin, of Providence, R .I., to cooperate with a committee of the Massachusetts Association of Boards of Health charged with promoting uniformity in annual health board reports. The U. S. Bureau of the Census has conferred with both Doctor Chapin and with me regarding the classification of health-board expenditures in its "Statistics of Cities." I have previously presented my proposed classification in the 1911 report of the Montclair Board of Health, and before the 1912 conventions of the American Medical Association and the National Municipal League.

    - (e) Milk Control
    - (f) Pure Food and Drugs
    - (g) Pure Water
    - (h) Pure Air:
      - Ventilation
      - Gas Inspection

- II. Indirect or Remote Health-Protective Work.
  - (1) Municipal Cleansing.
    - (a) Garbage
    - (b) Ashes
    - (c) Rubbish
    - (d) Dead Animals
    - (e) Offal and Market Refuse
    - (f) Night Soil
    - (g) Sewage
    - (h) Street Cleaning and Sprinkling
    - (i) Smoke Prevention
    - (j) Fly Reduction
    - (k) Mosquito Reduction
    - (l) Rat Reduction
    - (m) Records
    - (n) Educational
    - (o) Publicity
  - (2) Private Cleansing.
    - (a) Plumbing Permits and Inspection
    - (b) Suppression of Smells and Miscellaneous Nuisances
- III. General—so far as not distributable under heads and sub-heads of II. and III.
  - (1) Records:
    - (a) Vital Statistics
    - (b) Accounting
    - (c) Miscellaneous
  - (2) Research
  - (3) Publicity
  - (4) Legal
  - (5) General Supplies—including Rent, Water, Light, Heat, etc.
  - (6) Administrative Salaries.

Distribute under each head and sub-head, as far as practicable, every such item as salaries, supplies (including freight, express and cartage), transportation, publicity, communication (postage, telephone, telegraph), educational, research, legal, records, etc. Sums that cannot be so distributed, which should be comparatively few and small, go under III, General, but even here they should not go under "miscellaneous" or "unclassified."

Communicable Diseases, items (a) to (f), should preferably be given separately for each disease, or at least for typhoid fever, scarlet fever, diphtheria, and tuberculosis.

This classification is easily expanded by further classification to any extent desired, and it may be simplified even more readily by omitting all the sub-heads designated by letters or still further by using only the three grand divisions I, II, and III. In either case of simplification the sub-heads not used as separate accounts would serve as a guide to such of the classifications or accounts as were retained.

THE COLLECTION AND DISPOSAL OF CITY WASTE AND THE PUBLIC HEALTH.

P. M. Hall, M.D.,
Commissioner of Health, Minneapolis, Minn.

Read before the Municipal Health Officers' Section, American Public Health Association, Washington, D. C., September, 1912.

At the expense of exciting both criticism and ridicule, I venture to discuss the relation between the collection and disposal of city waste and the public health. City waste is composed of household refuse, barn refuse and street refuse. Household refuse comprises garbage, rubbish and ashes; barn refuse comprises manure, bedding and all stable waste; street refuse comprises street sweepings. Any complete system of collection and disposal must take into consideration the handling of all of these. The proper care and handling of household refuse will inculcate habits of cleanliness in and about the home, will mitigate in a large measure the breeding of flies and the presence of rats. The handling, by the municipality, of all stable refuse and street sweepings, which are so largely composed of manure, is the greatest factor in abolishing the fly. The removal of manure should be thoroughly done, at least during the fly breeding season, if the fly is to be gotten rid of.

It is assumed in this discussion that all forms of refuse will be disposed of in a sanitary manner. It is also assumed that not only all forms, but all of the waste produced within the municipality will be collected. The ashes of the municipality of today are being used in the filling of low grounds with their standing water, thus doing away with the breeding places of mosquitoes, which are everywhere a nuisance, and in certain sections carriers of disease.

While it is a well-known fact that unsanitary conditions of the home and unclean surroundings do not cause or originate infectious disease, yet they do have a great influence upon the severity of the attack, and consequently have a direct bearing upon the mortality. It is yet a debatable question as to whether or no decaying vegetable and animal matter subject to human handling may not furnish breeding places for pathogenic germs.

The study of bacteriology and the origin of infectious diseases is not a closed book, there probably is much yet to be learned. The physical aspect of a city should ideally be as clean as the cleanest home. The greatest sanitary improvements of modern times which have resulted in lessened morbidity and mortality have been accomplished and perpetuated by a physical clean-up. The instances of Havana, Manila, New Orleans, San Francisco, Richmond, Jacksonville, and the Canal Zone are so well known that they need but be mentioned. Differences of climatic and meteorological conditions do not alter the situation. The incident of the board or department doing the work does not change the situation. The discussion of what may be termed the "direct causes" of disease in contradistinction to those known to be "indirect" are too technical for the average householder to understand. These discussions, no matter how profound, do not change the deep seated conviction in his mind that cleanliness makes for health. Scriptural injunctions, traditions and household teachings for the centuries have emphasized the relationship between cleanliness and health. How much easier become the lessons of personal hygiene, that the "individual" is the disease carrier, if that "individual" has been taught from birth the lessons of general cleanliness? These teachings of the centuries cannot be wiped out or set aside in a day by the doctrines of the new public health. They should be taught together, one logically follows the other.

The causes of many diseases known to be infectious are still to be found. How radically exact knowledge as to disease causes changed the question of the proper handling of malaria, yellow fever, typhoid and the hookworm. In the handling of outbreaks of infectious diseases we now look to the individual as the carrier. Why should we ignore the surroundings? Will not the individual carrier of diseases appreciate the lessons of personal hygiene better in clean surroundings than in those that are dirty? Is it consistent to advocate sleeping porches, and the open air life, when the air is charged with the odors of decaying animal and vegetable matter?

The story of the fly, the flea, the mosquito, the rat, the hook-worm and the louse as disease carriers, is still a new one. Any measures which tend to reduce the breeding of these insect and animal carriers of disease, certainly has a direct bearing upon the public health. When the individual has learned the significance and importance of clean air, clean soil, clean water, and clean surroundings, it will be an easy step to understand about insect, animal and human carriers, how they are but the mediums for extending human contact. The more we learn of significance of human handling, of human waste, of human filth, of human excrement, the greater will appear the dangers of contact. Therefore, let us realize that in the proper collection and removal of all city waste, we are lessening the opportunities for direct and indirect human contact, and thereby contributing directly to the conservation of the public health.

DISCUSSION.

Mr. M. N. Baker, *Montclair, N. J.*:

I am strongly of the opinion that the collecting and disposal of municipal refuse should not be vested in boards of health. I do not think it is proper work for them to do. I think that other departments of the city government are better equipped to do such work, and that the work of the board of health or health department ought to be restricted to work which has unquestionably been proved to have a vital relation to health. I do not think you can find any proof whatever that garbage collection and disposal has any material relation to health. I haven't time to elaborate upon this, the program is so crowded, but I call your attention to the fact that Doctor Howard's most recent work on the fly, states that the house fly does not breed in garbage, it is another kind of fly that breeds in garbage, according to his statement. The experiments made with the burial of flies in sand or fly eggs may or may not have any material relation to what will happen with actual garbage when buried in earth. I won't take up any more of your time now. I am on the program later. This might be elaborated upon at great length. I want, for the present, merely to put on record strongly my opinion, after many years of observation and study, that boards of health, until they are taking care of many things they are not taking care of at the present day, should leave the collection and disposal of municipal refuse alone.

Doctor Gillett, *Colorado Springs:*

It is probably right that boards of health should not take up the question of the removal of garbage, but if they do not, who will? We exist as the guardians of the people's health; the removal of garbage is necessary for the health of the community, and if the health officers don't find it out, who is going to? It seems to me that if the board of health does not take up the question of the removal of garbage and manure and the breeding of flies, it will be left entirely undone. In Colorado Springs we have a dump a couple of miles from town, and all manure, etc., is dumped there; that is, we keep a fire there all the time and if you put a dead horse on it, the manure will burn up the horse. Manure is most excellent for burning up garbage and there is no breeding on this dump at all, Everything is burnt to ashes.

Dr. F. W. Wright, *New Haven:*

I don't think anyone will question that it is not the province of the health department to remove these things. But all health departments depend on the appropriations given them from the finance board, and it is hard work to make the finance board see the necessity of removing all these things and paying a sufficient sum to have them removed under proper sanitary conditions. That is the way in my city and I don't believe it varies much in others.

Col. J. R. Keane, *U. S. Army:*

There is no relation between garbage removal and public health. I recently had occasion to look into the matter in Porto Rico and it struck me that one of the primary problems there was to get a method of garbage disposal which would prevent the feeding of rats. If the disposal of garbage had not been immediately under the department of health, I think that the plague would have spread. It seems to me there are other ways in which the disposal of garbage is related to the prevention of diseases. As to the statement that the fly that breeds in garbage is a different fly from the ordinary house fly, I am somewhat skeptical. We all know that the ordinary house fly lays its eggs in garbage, and I think that these eggs in the course of time hatch out.

Dr. A. J. Orenstein, *Ancon, C. Z.:*

I have no knowledge of the financial situation in municipalities and how this affects the desirability of the health department's controlling garbage. After an experience of seven years in the Canal Zone—doing our work ourselves and then having it done by other divisions of the Federal Government—it is the unanimous opinion of Colonel Gorgas and all the members of his staff that, in order to do sanitary work most economically and efficiently, it is better that the appropriation be made direct to the department of sanitation, or the health department. That department understands the conditions and can adapt the work to the situation as it exists and to the various changes in our knowledge of taking care of refuse. In the Canal Zone we have incineration in the city of Panama and Colon. I beg to differ with Professor Howard about the breeding of the house fly. In the tropics at any rate it breeds in garbage, and breeds profusely unless restrained. But we restrain it by burning the surface and applying a rosin phenol which we manufacture and which I believe prevents breeding. An actual study of expenditure has proved, in the Canal Zone, that it is cheaper to have the appropriation handled directly by the sanitary department and have the sanitary department do the actual work, rather than allow, as has recently been the case, the quartermaster's department and other divisions of the Federal Government to do the work of garbage disposal.

Dr. E. C. Levy, *Richmond:*

I want to go on record that there is an intimate relation between the collection of waste and the public health, especially if, under the term "waste," we include night soil. I preached the opposite doctrine for a good many years, but I consider that I was on the wrong track. I am now firmly convinced that these things are intimately associated with public health.

Doctor Tuttle, *Montana:*

This question of what particular fly breeds in garbage does not seem to have any particular bearing on the question, in my mind. All flies have legs and can carry germs to our food. The street commissioners in a good many towns, especially in the West, will clean up about half of the garbage and let about a third of the contents of the garbage can fall on the ground. If the commissioner is under the health department and is made to clean it up thoroughly, he may do it. I don't believe you can get thorough garbage removal and disposal unless it is in some way under the health department.

Dr. G. L. Kiefer, *Detroit:*

The remarks of the last speaker made me feel like getting up and making some remarks. He said unless the collection of garbage is in some way under the health department. Garbage collection in Detroit is done by the department of public works, and in a general way it is under the supervision of the health department. This does not mean much of anything except that the health department get the blame for the non-collection of garbage. They can't do much about whipping another department into line. Our experience there, I think, would bear out those who have spoken in favor of the actual collection being done by the department that should be held responsible for it, namely, the health department.

THE NEED FOR A MORE GENERAL CO-OPERATION BETWEEN HEALTH AND POLICE DEPARTMENTS.

Selskar M. Gunn,
Massachusetts Institute of Technology, Boston, Massachusetts.

Read before the Municipal Health Officers' Section, American Public Health Association, Washington, D. C., September, 1912.

Public health authorities are gradually waking up to a realization of the fact that much of the work that they have done in the past, and are in a large measure still doing at the present time, has little sanitary significance. Some health departments have already been successful in their efforts to have the work of plumbing inspection and the handling of the refuse of the community turned over to other departments of the city government. This is as it should be. By transferring such work over to those city departments with which it is naturally connected, health departments can direct their energies, in a large measure, to true health work; that is, to work of such a character, that it brings about the results that the health department is striving to attain, namely, the elimination of unnecessary sickness and the prevention of death from preventable causes. There is a growing tendency on the part of some sanitary authorities to divert a large part of the work of so-called general sanitary inspection to the police department. Such work takes up much of the time of the inspectors of the health department and constitutes one of the largest divisions of the department's labors. Germany in particular has led in this respect, and the good results obtained in certain cities in that country have been most marked.

It has been well pointed out by Chapin, Jordan, and others, that the greater part of sanitary inspection as now carried on has either no public health significance at all, or if so, to a very slight extent. Greater benefits for the community could be brought about by the sanitary authorities, if they were free to direct their resources and energies to an attack on some of their large and pressing problems. These problems have only been nibbled at in many cities, and in some instances have been left absolutely untouched; nevertheless, many of them give promise of beneficial results that are impossible of attainment by ordinary time-consuming sanitary inspection and nuisance work.

It must not be forgotten, however, that certain nuisances, which have been considered of little or no sanitary importance by some, have been pointed out by Levy and others to have real sanitary import, and that a growth of weeds, for example, on a city lot, while not dangerous on account of the weeds, may hide deposits of human wastes, which must naturally be considered of very grave danger, and furthermore, that such conditions may give rise to places where insects may both develop and receive infection, which they can carry and in this way infect foods.

Many conditions existing within the limits of a community are objectionable; they offend our æsthetic tastes, and are contrary to decency. The police department, which is established to look after law, order, and decency of a community, would be a more suitable department to attend to such work than the health department, for the average nuisance is much more likely to be of police than of health concern. There are many advantages of the scheme proposed which readily suggest themselves. One of the most important arises from the fact that at the present time, health departments are largely undermanned; they cannot make the necessary frequent inspections of their districts. It is recognized that the amount of inspection of a district increases directly the number of nuisances discovered in that district, and at the same time reduces the number of new nuisances which would be created were it not for the frequency of inspections. Another obvious advantage is to be observed in the size of the districts or beats covered by the police, as compared with the size of the districts covered by the sanitary inspectors. It need not interfere with the efficiency of the police force to make a regular inspection of back yards, vacant lots, etc., in their respective territories, a certain number of times a year, and the very fact that they are policemen, and not sanitary inspectors, would have a much greater effect on those who were accustomed to violate the city ordinances. Fewer nuisances would be created, and existing nuisances would be abated more rapidly.

Most nuisances arising from the dumping of rubbish on vacant lots are given birth under cover of darkness. Policemen are much more likely to discover such violations of the law at the very time of their perpetration than sanitary inspectors. With the police acting as general inspectors, there is both day and night inspection.

It is well recognized that the amelioration of a so-called insanitary condition is often very difficult to bring about through the Health Department. This is because of the difficulty, or even impossibility, of proving to the satisfaction of the court that the insanitary condition was capable of giving rise to disease. Reinspection would be an easy matter, and would not consume much time. The patrolman would not have to make a special trip to see that the order had been complied with. His ordinary patrol work would make it both possible and easy for him to visit the place every day, if necessary, and this would be an added incentive, in many instances, to the person responsible, to clean up or make the desired change.

It would not take a district long to learn to expect this constant inspection, and as a result the number of nuisances should quickly decrease, and the ideal of a clean city would be much nearer than before. The police already have to deal with the abatement of nuisances to some extent, ordering the removal of snow from sidewalks and enforcing the anti-spitting ordinances.

Special training on the part of the patrolman is not a requisite in order to enable him to do outdoor general sanitary inspection work. Moderate intelligence is all that is required, and in the event of a patrolman discovering any condition that might actually produce disease, or about which he was in doubt, he could report his finding, through his station, to the health department, which would have its district inspector visit the place and make an investigation.

Noise nuisances, which are worthy of considerable attention, should also be in the hands of the police department.

Simple forms of reports should be used by the patrolmen for each inspection. If the conditions were satisfactory, there would be no need for anything more than the address, date, the O. K., and initials. These reports should be kept in special note books. It would not take long to educate the public to a knowledge of the fact that the police department was the one to complain to in case of nuisance. Officers would doubtless receive complaints while on their beats, and telephoned or written complaints could readily be assigned to the patrolman of the beat in which the nuisance was supposed to exist.

Cases of failure to abate nuisances could be dealt with summarily by the police department, and would not have to go through the long, and at times uncertain process that seems to be essential in many places to cases prosecuted by the health department.

Many cities already give the police department, in the laws and ordinances under which it operates, full power in the matter of prevention and abatement of nuisances. Where this is not the case, it should be comparatively easy to have the necessary power conferred on the police department by ordinance, if the city charter permits.

ADVANTAGES.

The four main advantages of such a plan as outlined above may be summarized as follows:

(1) Increase of efficiency of public servants in the amelioration and prevention of nuisances, and a resulting cleaner and more decent city.

(2) Health department able to devote more of its time to true health work, and to bring about healthier community.

(3) The development of coöperation between police and health departments.

(4) No added cost to city.

METHODS OF OTHER CITIES.

In order to discover what was being done in the large cities of this country along this line of police inspection, the following questions were submitted to the chiefs of police of the twenty-seven largest cities in the country.

(1) Does the police department make any general inspections of the city by its patrolmen for nuisances, dirty lots, cellars, etc., or is this work done entirely by the health department?

(2) If done by the police department, how many inspections are made each year of each piece of property or premise? Are records kept showing the number of such inspections per year? Is it done in the regular rounds of the patrolmen?

(3) What is the procedure in cases where violations of the city's ordinances are discovered?

(4) Are you in favor of having the patrolmen do this general inspection? Give reasons for or against.

Twenty-one answers were received. The results of this inquiry are here given. The opinions of the various police chiefs are, of course, the opinions of those in office at the time of this study. (May, 1911.)

New York.

Section 312 of the Greater New York charter provides as follows:—"The Police Commissioner upon the requisition of the Board of Health shall detail to the service of the said Department for the purpose of enforcing the provisions of the sanitary code, and the acts relating to tenement and lodging houses, not less than fifty nor more than one hundred suitable officers and men of at least five years experience in the police force. At least thirty of the officers and men so detailed shall be employed exclusively in the enforcement of the laws relating to tenement and lodging houses. These officers and men shall belong to the sanitary company of police, and shall report to the Board of Health. The Board of Health may report back to the Police Department for punishment, any member of said company guilty of a breach of order and discipline, or of neglecting his duty, and thereupon the Police Commissioner shall detail another officer in his place, and the discipline of the said members of the sanitary company shall be in the jurisdiction of the Police Department, but at any time the Board of Health may object to any member of said sanitary company on the ground of inefficiency, and thereupon another officer or man shall be detailed in his place."

These men are practically sanitary inspectors with full police authority.

The various duties of this sanitary squad are as follows: enforcing sanitary inspectors' notices; making inspections on sanitary inspectors' notices; investigating citizens' complaints; inspecting manure, ash and garbage dumps, and offal dock; enforcing isolation of contagious diseases; destroying animals condemned by veterinary surgeons of the department of health; and making arrests for all violations of the sanitary code.

Chicago.

Here inspections are made entirely by the health department. The general superintendent of police is not in favor of patrolmen doing inspection work "for the reason that it takes up too much of their time, and their services are required in the more important work of protecting the lives and property of citizens; also for the further reasons that such inspections should be made by persons skilled in the laws of sanitation."

St. Louis.

The chief of police reports that his department works in conjunction with the health department in the abatement of nuisances. Patrolmen on their rounds are on the lookout for insanitary conditions, and all conditions of this kind which are found are at once referred to the health department, which presumably makes a further inspection. No records of the number of inspections are kept by the police authorities. The work is looked upon only as a matter of daily routine. No specific time is designated for this particular work. Prosecutions are made through the health department. The chief of police is in favor of having the police department work with the health department "in regulating sanitary conditions, as the officers are certainly more familiar with their respective beats than are the health inspectors."

Boston.

In this city "where nuisances, dirty cellars, etc., come under the observation of the patrolmen, the cases are reported to the Board of Health." No forms are used in connection with this work.

Baltimore.

At the request of the health commissioner a general sanitary inspection is made yearly by the officers of the police department. The health department is furnished with the reports of this inspection and has to see that the law is enforced.

The police marshal believes that his department is "better equipped to make the yearly sanitary inspection than any one else."

San Francisco.

Patrolmen report anything they observe in relation to dirty lots, nuisances, and cellars, etc., but no regular inspections are made except in emergency cases. The chief of police does not approve of the police "acting as inspectors, for the reason that this is not police duty."

Detroit.

In this city a detail of patrolmen in uniform, known as the sanitary squad, under command of a special captain, do the work of inspection for sanitary conditions. They coöperate with the board of health. Each member of this squad has a district which he takes care of, going over it as often as possible. Records are kept of all violations found, and the legal side of the question is in the hands of the police department.

Washington.

The police department coöperates with the health department in reporting all nuisances, dirty lots, alleyways, streets, etc. They do not take into consideration, or enter, private premises. No special times are set for such inspections. The superintendent of police is in favor of the members of the police force reporting all such cases, but is not in favor of members of the police force taking summary action. In the words of the superintendent: "That is a matter which should be handled by the Health Department alone. The Police Department should be free from the exercise of any duties other than those looking to the protection of life and property, the suppression and detection of crime and the preservation of the public peace."

Jersey City.

"It is the duty of the officer on post in his regular rounds, to make an inspection with a view to locating nuisances resulting from dirty lots, cellars, etc., and to submit a report of such to his commanding officer, who in turn forwards it to the Health Department. A Health Inspector then makes a further inspection."

The chief reports that this method works out very satisfactorily in this city, and that in his opinion it is a practical way of handling the matter.

Minneapolis.

General inspections on the part of the police department for insanitary conditions are not made in this city. Any cases coming under the special notice of the patrolmen that demand attention are promptly reported to the health department.

Providence.

The procedure in this city is identical with that of Minneapolis. The acting superintendent of police states that he is not in favor of having police inspection of nuisances, as he considers that it belongs to the board of health.

Indianapolis.

In this city, on or about the first of May, the patrolmen on day duty make a general inspection of all alleys, back yards, out-houses and vacant lots. These inspections are made in the regular rounds of each patrolman. Records are made of all insanitary conditions found, and the property owner or agent is served with a notice giving him ten days to clean up and abate the nuisance. This inspection is only made once a year and is in the nature of spring cleaning. The superintendent of police is "heartily in favor of having the patrolmen do this work, as it quickly adds to the general health of the city, and to its cleanliness and beauty, and on account of its economy, does not interfere with the regular work or efficiency of the patrolmen, and gives them a chance to investigate other conditions for the betterment of the service and the good order of the city." It takes the police department one month to accomplish the necessary work.

St. Paul.

The chief of police writes as follows:

"Patrolmen are required to report to their stations any nuisance, dirty lots, etc., found on their respective beats. No records are kept showing the number of inspections. Parties owning or renting property where a nuisance is found are instructed to clean or have same cleaned at once. If they fail to comply within a reasonable length of time, a warrant is sworn out by the officer for their arrest."

Kansas City, Mo.

Patrolmen on post make reports of all insanitary conditions which may come under their notice. These reports are forwarded to the health department. These inspections are not made at any special time but go on from day to day, "as the occasion may demand," and are made by the patrolmen on their regular rounds. The abatement of nuisances is entirely in the hands of the health department. The chief of police is in favor of having patrolmen on post make these general inspections.

Rochester.

General inspections for nuisances, dirty lots, cellars, etc., are not made by the police department. However, both police and health administration is under the department of public safety, and the police, incidental to their other duties, report all such conditions and assist in remedying them. Records are kept by the police department of all insanitary conditions found by the patrolman. The chief of police is in favor of the patrolmen doing the work of general inspection, "as experience has shown that their commands and orders are more promptly complied with than those given by Lay inspectors."

Los Angeles.

In this city all members of the police department are sworn in as deputy health inspectors and do a great deal of inspection work for the inforcement of health laws where the locations are of such a nature that the offending parties can be prosecuted. Where the insanitary condition is of such a character that it demands an inspection by the health department, that department is notified and attends to the further steps necessary to obtain the abatement of the insanitary condition. No records are kept of the reports made by the officers, as the force is restricted to a limited number of men and cannot afford to put a man on clerical work.

Pittsburgh.

No general inspections for nuisances, dirty lots, cellars, etc., are made by patrolmen. This work is done by a special "sanitary division" of the bureau of health, which has no other duties. Police officers, however, supplement the health department service by reporting all infractions of the law coming to their notice to the sanitary division of the bureau of health.

Cleveland.

There is no coöperation between the police department and the bureau of health, the chief believing that sanitary inspection is clearly "the duty of the Health Department, and the Police Department has all it can do to properly attend to its own duties."

Newark.

The police department does not undertake special sanitary inspection. Police officers, however, are required to report all violations which come to their notice. The chief is not in favor of having patrolmen undertake special sanitary inspection for the same reasons as given by the chief of police of Cleveland.

New Orleans.

Police officers report any violations of the sanitary code that come to their notice to the board of health.

Cincinnati.

Sanitary inspection is in the hands of the health department.

Review and Recapitulation.

The chiefs of police of five cities were opposed to any sort of coöperation between the departments on inspection work. Eight were in favor of coöperation and of having sanitary inspection work performed by the police department. It will be noticed that the amount of inspection work done and the methods employed vary considerably in the different cities.

The sanitary squad system is employed in New York and Detroit, although in the former the policemen are under the health department as far as the direction of their work is concerned. In Pittsburgh the sanitary squad is merely a division of the health department.

The common practice in the majority of the cities that replied consists of a single report to the health department of any condition that the patrolmen come across, which they consider should be looked after. This implies no special inspection to find such conditions. It is necessarily inadequate, and cannot be accepted as in any way taking the place of the thorough inspection that should be made.

A temporary intensive coöperation exists in Baltimore, Indianapolis and Los Angeles, where the police department assists the health department in conducting an annual spring cleaning. This works satisfactorily but only serves a limited purpose and implies that as soon as it is over, the people are at liberty to again commence their protracted collection of rubbish and filth, which in a year's time will be cleaned out and removed. None of these plans can be considered in any way as satisfactory as a constant inspection would be. Regular inspections should make spring cleaning unnecessary. The method of New York and Detroit in maintaining special sanitary squads, while admirable in many respects, is necessarily very expensive and cannot be considered economical for most cities.

DISCUSSION.

Mr. J. S. MacNutt, *Orange, N. J.:*

This idea is perhaps not quite so new as it appears at first sight. In talking to the Chief of Police of my own city a few days ago, he informed me that twenty years ago it was the practice of the police at a time when there was no adequate board of health, to go about the city every spring and give the city a general cleanup and that this was very effective at that time. Now, I think that from the point of view of the health officer, there will be entire agreement with what Mr. Gunn says. There is no doubt that we spend a great deal of time going back and forth making reinspections, trying to get very small nuisances abated, and we should like very much to see it put into the hands of a body that would handle it as efficiently as the police certainly could.

However, from the standpoint of the police, I think there is some question. The police would look upon these things as rather ordinary and insignificant. We have got to persuade the police as well as ourselves that this plan can be put into effect.

Doctor Snow, *Sacramento, Cal.:*

It might be of interest, in connection with this, to recall the general trend of city administration, especially in the light of both these papers. In my own state, the very decided trend is toward the commission form of government and in a very great many of the cities that have adopted this form of government, both the police and health departments are combined under one commissioner who is made directly responsible, not to the mayor or board of councilmen or anybody above him, but to the people, for his department of public health and safety, and if that is the practical outworking of municipal forms of government, it means that the police and the health inspectors will come under one administrative head and there is no reason why, it seems to me, all these things that have been suggested should not be worked out. Naturally, a man who has responsibility for one of these departments, and therefore sees clearly his money shortage for operating both departments, is going to put every man at his disposal to the best use, and so I think that there are indications that, in our cities, the thing which has been suggested by Mr. Gunn is coming.

Doctor Scholl, *Peoria:*

I enjoyed Professor Gunn's paper very much, and would like to state the experiences we have had in Peoria. We had eight wards in the city, and when I came in there were three to four sanitary inspectors for each ward. Sometimes we had twenty-four and at other times thirty-two men, and there was a great deal of money paid out just for the sanitary inspectors. We found that we were not getting the results we would like, so we called a meeting of the board of health and discussed the same question Professor Gunn's paper has just taken up. Now instead of having twenty-four inspectors at one time, we have four men doing the work of the health department, and the police department has taken up the inspection night and day. We get very good results, and we have been doing so for a year. The people pay more attention to a uniformed police officer than to a sanitary officer, and the police make their reports to the captain, or chief, and he in turn makes his report to our office and then our general inspector goes out. We also have a civic federation, formed by the ladies, and they are acting as sanitary inspectors during the day. They have appointed two or three from each precinct in each ward and they in turn report to the health department, We have thus done away with a great many inspectors and have a much cleaner city than we had before.

Doctor Sanders, *Alabama:*

I wish to invite the attention of this body to the need of trained sanitary inspectors. So far as I know, there are no trained sanitary inspectors now in the service of any city. For a number of years I have been identified with the medical department of the university of my state, and long ago I endeavored to prevail upon the faculty of that school to introduce into the course of instruction a curriculum adapted to the training of sanitary inspectors. They need training just as nurses need training. In my opinion, it is not possible to obtain efficient service, either from policemen or from sanitary inspectors, unless they receive proper training in this work. Trained inspectors would be just as valuable to health authorities as trained nurses are now to physicians in their practice. I have long desired to see every city supplied with educated sanitary inxpectors.

Dr. P. S. Schenck, *Norfolk:*

I have had some personal experience in the working of a police department and health department, and in my city it has been a miserable failure. The city of Norfolk is governed not by a commission form of government, as in the West, but by a board of control, composed of three gentlemen, and the different bureaus are divided among those three. For quite a while one member of the board had the police department and the health department, and we caused an ordinance to be passed making it the duty of policemen to report nuisances and carry out health ordinances and laws. It was a miserable failure. A policeman thinks it beneath his dignity to report a nuisance. At the solicitation of the women's league, I had anti-spitting signs put all over the city, and especially requested our chief of police and members of the board of control to see that the anti-spitting ordinance was enforced, but in a whole year, there was not a solitary arrest. There seems to be a conflict of authority. If the health commissioner complains to the chief of police about a dereliction of duty on the part of one of his officers, he is offended and takes it up with the board of control and you don't get the coöperation you expect to get. I believe you get better service from uniformed officers, and in my city all sanitary officers wear full police uniforms. We find that the public generally respects the officer's authority more than formerly, but my experience as a health officer demonstrates that you do not want that conflict of authority, and to carry out your laws and ordinances, it should be done directly by the health officer himself, who delivers his orders directly to his own men.

Doctor Slemmons, *Grand Rapids:*

I want to voice Doctor Schenck's opinion. Take the viewpoints of the health officer and the police officer—they are entirely different. They look on their work in our city just as Doctor Schenck says they do in his city. They may look after these things for a few weeks and then they are entirely forgotten.

Doctor Ball, *New York:*

It seems to me the question of the coöperation between the police and the sanitary inspectors, depends a good deal on the size of the city. In smaller cities, cities of the third class, the chief duty of the police seems to be carrying in a few drunks. They might be trained to see the nuisances that occur in the various wards of the city. Their uniforms and the constancy with which they go over these wards are of great advantage.

Doctor Wright, *New Haven:*

I cannot see how that simplifies the work of the health department. It is easy enough to find nuisances, but finding the owner of the property, serving notice and finding out by reinspection whether these orders are obeyed is another matter.

Doctor Ball, *New York:*

That is just the point. We get a report of a nuisance and we have got to send our sanitary officer there. He has to look up the title and see who the owner is, but I believe if we had a uniformed officer going there, we wouldn't have to do that so much.

Doctor Edwards, *Gloversville:*

We have a sanitary inspector and he goes over and visits these nuisances and abates them, but in addition, we have a school nurse and tuberculosis nurse and I believe that a woman can do more than a sanitary inspector or a uniformed man, and accomplish better results. She goes in the homes and in that way you get a better sanitary condition.

Dr. C. H. Landis, *Cincinnati: N. Y.*

My limited experience along the lines suggested by this paper, has absolutely demonstrated its value in Cincinnati. We have a population of 380,000 people and we have eleven sanitary inspectors and 800 regular policemen. We have had nuisances in Cincinnati that have existed for a year. The property owner received his notice, told the inspector to go to hell, and the nuisance continued to exist. Shortly after the first of January, Mayor Hunt issued an order that the regular police should take up a section of the city and they were given instructions, through the director of public safety, as to what conditions they should look for and what orders they should issue. We immediately began to get results. It is almost impossible for eleven men to serve a city of 380,000 and do it any sort of justice at all. The 800 policemen are scattered over the city; they cover a limited area and cover it two or three times a day. There is no use in trying to deny the effect of the uniform. When the people receive their orders from the man in uniform, they get busy. I am thoroughly in sympathy with the paper as presented by Mr. Gunn.

TUBERCULOSIS, A PUBLIC HEALTH PROBLEM.

Robert H. Bishop, Jr., M.D.,
Director of Tuberculosis Bureau, Department of Health, Cleveland.

One has but to look over the report of the National Association for the Study and Prevention of Tuberculosis to realize that every year hundreds of new communities are recognizing the fact that tuberculosis presents for them a problem. The ever increasing number of societies organized "for the purpose of eradicating tuberculosis from our midst" speaks volumes for the effectiveness of the nation wide campaign against a common foe. On every hand, we see groups of interested citizens banding themselves together bearing aloft the Double Red Cross, we see the establishment of dispensaries, the erection of hospitals and sanatoria, and the employment of visiting nurses. We see, also, many hundreds of patients being cared for, made more comfortable in the last days of a lingering illness, or nursed back to health and strength; and best of all we see, thousands upon thousands of men, women and children learning the value of good health, how to get it, how to keep it. A most inspiring spectacle! We see, also, each year the need for new dispensaries, more nurses and the increasing number of afflicted needing care. The thousand dollars gladly given last year by an interested public to help the work of an appealing charity must be multiplied by ten in order to meet the demands that a year's efforts call forth. There is scarcely a community where an active campaign has been waged over any length of time which does not point with pride, and rightly so, to its increased number of nurses, its new dispensaries and the thousands of dollars more that were raised and spent this year over last year.

But what is to be the end of all this? Is the highly organized, richly endowed, generously supported private charity to eradicate tuberculosis? No, by all means, No, and the community that has not come to that conclusion is to be pitied. The organization to which we must look for the ultimate eradication and control of tuberculosis must be the Health Department, local and state; and it seems to me that, if the work of private, charitable organizations has demonstrated any one thing, it is this.

There are two chief causes, as I see them, that are bound to limit the working out of this problem, under the direction of a private organization:

1. Insufficient funds.
2. The lack of authority.

We look to the city or state to provide the necessary hospitals and sanatoria. Our sanitary inspection, our food and milk inspection, are functions of the Health Department, without question, as well as the control of the epidemic diseases. We come each day to a more thorough appreciation and understanding of the inter-relationship existing between tuberculosis and every phase of the public health problem and the absolute necessity for a correlation of every branch of the work. And yet the control of a contagious disease is being left to a group of social workers, enthusiastic and narrow in the extreme, but who have nevertheless demonstrated in a no uncertain manner the routine to be gone through with in the handling of a dangerous disease.

What is the reason for all this? The reason is to be found upon examination of the health officer, the man at the head of the Health Department, and examination of this individual will disclose the fact that in four cases out of five, he has no social vision, he sees the functions of a Health Department to be the same as they were twenty years ago. Consequently, the Health Department has no standing in the community, and the various private, charitable organizations stand for more in the eyes of the public in the prevention of disease than the Health Department.

The private charitable organization that is doing anti-tuberculosis work is face to face with an all-important problem, the problem of shifting the work that it is now doing efficiently and well, but in a limited way, to the supervision and control of the Public Health Department where the work can be properly financed and brought into the proper relationship with established public health work. This will mean in some instances that the present incumbent of the health office will have to be replaced; in other instances, it will pay to educate him, and give him a chance to visit the cities where the Health Department has taken on a new lease of life; in other instances, it will mean that the vision of the director of the private organization will have to be enlarged. In any case, the so-called private organization that has not started out with a view to demonstrating what ought to be done, how it ought to be done, and then shouldering the responsibility for its being properly done upon the municipality, cannot be said, in my estimation, to have sensed the purpose of this campaign; nor, can it be said to be rendering value received for the support and confidence placed in it by a loyal, interested public.

No one, at least no one who has had any experience in the work, believes that tuberculosis is to be uprooted in this generation, or the next, and certainly not with the expenditure of the comparatively small sums of money given to the support of charity; the best that is hoped for is the rapid development of the means of control which will, in the briefest time possible cause tuberculosis to cease to be the terrible meance that it now is to every civilized community, and slowly, but surely, to radicate it.

In the fall of 1904, a small group of Cleveland citizens met at the call of

Dr. John H. Lowman to consider and discuss plans for the relief and assistance of the poor of the city who were suffering from tuberculosis. The immediate result of this meeting was a campaign of education, lectures were given, literature distributed in an effort to teach the public concerning tuberculosis; with the employment of a nurse to visit the poor consumptive in his home came the realization of the need of a free dispensary where such cases could be examined, and to enable the doctor and nurse to work together; for, it was soon apparent, that without a thorough understanding of home conditions the doctor could not wisely advise, and also, without the assistance of the nurse in the home, advising here, enlisting aid and assistance there, the doctor's instructions were worse than useless. Thus grew and developed one of the very first social dispensaries in the United States.

Two years later, the city opened a hospital for advanced cases, providing fifty beds; in 1908, a sanatorium, of eighty beds, was opened for early cases, and the Health Department made tuberculosis a reportable disease; in the same year, the Health Department undertook the free examination of sputum; these were early results of the activities of the League. As the work grew, there followed the employment of more nurses, the establishment of a sanatorium for tuberculous children and a day camp; but in every instance, the work was started with a view to demonstrating what should be done, and how it should be done.

Three years ago, the League felt that the time had come to transfer some of its work to the city. A carefully prepared report, giving the results of the experiments in the various lines of work, and asking that a Bureau of Tuberculosis be established, under the Health Department, with an appropriation of $30,000 a year was presented to the mayor, and, in turn, to the city council; the result was the appropriation of $7,000 for immediate use in the establishment of the bureau. Since then, the appropriations have been increased until $25,000 a year is given the Health Department for its Bureau of Tuberculosis (there are no hospitals maintained under the Health Department) and the League has gradually shifted the entire responsibility of dispensary control and nursing care of the tuberculous to the city, thereby relieving itself of an expenditure of $6,000 annually. This does not mean that the League is going out of business in any sense of the word—it is taking up the demonstration of new and necessary lines of work.

Today, in Cleveland, all the tuberculosis work of the city centers in the Health Department. What, then, after two years of control of the tuberculosis work, by the Health Department, can be shown to be the results, and what are the special features, if any, of the organization?

The organization is simple—

1. The Bureau of Tuberculosis—
    - Director of Bureau—a physician with social training.
    - Four assistant physicians—each one in charge of a dispensary.
    - Superintendent of Tuberculosis Nurses—17 nurses on staff. Each one of the four dispensaries has a head nurse, who is permanent, the others are assigned and shifted as the needs of the districts demand.
    - Four clinic clerks.
    - Two stenographers.
2. The Hospital Admission Bureau, controlling admissions and discharges of cases from all institutions handling tuberculosis cases:
    - (1) Hospital for advanced cases.
    - (2) Sanatorium for advanced cases.
    - (3) Sanatorium for children.
    - (4) Preventorium.
    - (5) Day camp.
    - (6) Open air schools.

The private agencies coöperate with the public agency in the placing of all cases.

Aside from the advantages that come of course as a result of having more money to spend, making possible more dispensaries and more nurses, is the advantage of having all tuberculosis work centered in one office; there are not three and four different groups responsible, the public, all institutions, turn to the Health Department when it comes to the handling of a case of tuberculosis.

The compulsory notification and registration of all cases of tuberculosis is recognized as one of the very first and most important measures to be adopted and insisted upon by any community in its warfare upon tuberculosis and, naturally, such a regulation can only come through and be enforced by the Health Department. Most communities have adopted such measures, but very little information is available as to the thoroughness and effectiveness of the enforcement of the measure. The private physician is, for the most part, blamed because the records are not more complete, but my conclusion is that, while the physician may be neglectful once in awhile, the burden of the blame rests upon the Health Department. In practically every instance, where there has not been the necessary coöperation between the Health Department and the physician, a word of explanation is all that is necessary to secure most active and intelligent coöperation. Once the physician feels that there is an intelligent force in the Health Department ready to be of assistance to him, he gladly avails himself of its services. It is no wonder that physicians lose interest in reporting cases only to have them recorded for the purpose of statistics. Physicians may report cases by telephone or postal card, and we also accept the report from the City Laboratory where sputum is examined free of charge. In the latter instance, however, the physician is called by telephone and the name and address of the patient verified. Upon report of a case, the physician is asked if he cares to have one of the department nurses call and provide the patient with paper napkins and to give general instructions. The physicians have come to value the services of the carefully trained and efficient force of nurses provided to do this work and every month shows increase in the number of private physicians' cases being visited by our department nurses.

One of the first things to be done after the establishment of our work was to send a printed slip to each physician in the city, asking him to report all the cases under his care. A statement was also made concerning the work newly organized under the department and his coöperation and interest asked for. As a result of this census, we received reports on approximately 1,200 cases. Two months later, after an opportunity had been offered to check through the file of reported cases, which was found to contain many duplicates and dead ones, a list was made of the 6,000 cases then on file and the serious work of locating every case was begun. The physician who had last reported the case was interviewed, and if he knew nothing about it the nurse went to the last given address to see if the case could be found. At the present time our bureau records show the following number of cases:

Total number of cases reported under the care of private physicians	1,350
Total number of cases not found reported by private physicians	664
Total number under the care of private physicians at the present time	686
Total number of cases reported under the care of dispensaries	1,699
Total number of cases not found reported by the dispensaries	487
Total number under the care of the dispensaries at the present time	1,212
Out of town cases	729

These figures represent the positive cases. In the case of those under the care of the private physicians, 98 per cent. of them are sputum positive cases; very few physicians report cases positive unless they have a positive sputum. At the first of the year 3,049 positive cases of tuberculosis were recorded living in the city. Recording the reported cases, picking out the duplicates and keeping the files accurate, is a large task and keeps one girl busy all the time.

There has been a steady increase in the number of cases reported both by physicians and dispensaries. During the first five months of 1911, during which time the Bureau had not taken up the question of registration but was getting the new dispensaries started, there were reported to the Board of Health 669 cases of tuberculosis, an average of 33.8 per month; during the remaining seven months of that year there were reported 1,829 cases, or an average of 232.7 per month—an increase of 689 per cent.;

during the twelve months of 1912, there were reported 3,295 cases or an average of 274.5 cases per month, an increase of 17.9 per cent. per month over last year, and at the time when a city census was being taken, and when naturally a great many cases would be reported. Comparing the monthly reports of two years ago, before the Bureau was established, showing an average of 33.8 cases per month, with the average of 274.5 per month for the past year, we find a fairly good showing. Not all of these cases were new unreported cases by any means; in fact, during 1912, 56.6 per cent. of the cases had been previously reported, leaving 1,430, or 43.4 per cent. new or unreported cases.

The questions now arise, what percentage of the cases are known to the department before death, and knowing that percentage, and given the total number of cases registered, is it possible to make a fairly accurate estimate of the cases in the city. I give the figures in detail for the sake of comparison, dating from the time of the establishment of the Bureau:

1911

Number of deaths from Pulmonary Tuberculosis reported to the Board of Health:

June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
70	70	42	64	65	55	87	453

Number of cases not previously reported to the Board of Health:

June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
11	16	7	18	28	18	17	115

1912

Number of deaths from Pulmonary Tuberculosis reported to the Board of Health:

Jan.	Feb.	Mar.	Apr.	May.	June.	
71	59	66	70	68	51	
July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
46	48	51	63	37	45	675

Number of cases not previously reported to the Board of Health:

Jan.	Feb.	Mar.	Apr.	May.	June.	
9	8	8	9	12	11	
July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
11	9	8	5	5	5	100

Again will be seen the evidence of increased efficiency; in 1911, 25.3 per cent. of the deaths were unreported; what it was before the Bureau started, we have no way of knowing; in 1912, 14.9 per cent. of the deaths were unreported. The average is fairly even. In one month (October) as will be seen, 92.1 per cent. of those dying had been previously reported.

The next point of interest is to learn, if possible, why these cases were unreported. With that end in view each physician signing a death certificate was interviewed, and these are the results:

REASONS GIVEN BY PHYSICIANS FOR NOT REPORTING CASES WHERE PATIENTS DIED.

Physician neglected to report case to Board of Health (no excuse)	42
Physician saw patient but once, at time of death	23
Physician treated patient for another disease, but death certificate was classified under tuberculosis	9
Physician claims that case was previously reported to the Board of Health	7
Where death certificates were signed by coroner	8
Where physician had not seen patient since patient's return from out of town	4
Physician was called in after patient's death	2
Physician treated patient for pneumonia	3
Physician did not report case, as sputum was always negative	1
Patient died out of town, was brought here for burial	1
Total number of cases not previously reported	100

Only forty-two cases out of the 100 unreported cases can be said to have been unreported because of real neglect on the part of the physician.

The next most interesting question is in regard to the length of time these cases were reported before death. The average number of weeks the 575 cases were known to the Bureau was 32.9 or about eight months.

Number of cases reported one week, and under, before death	84
Number of cases reported one month, and under, before death	109
Number of cases reported three months, and under, before death	130
Number of cases reported six months, and under, before death	90
Number of cases reported one year, and under, before death	86
Number of cases reported over one year before death	35
Number of cases reported over two years before death	14
Number of cases reported over three years before death	27
Total number of cases previously reported	575

This average, however, is bound to increase from year to year.

What, then, can be said to be the constant tuberculosis population of the city? We find we have record of 85.1 per cent. of all the cases that die, and we have on record at the present time 3,049 cases—on that basis, then, we have approximately 3,587 positive cases in the city at this time. I know this figure does not accurately state the number of positive, dangerous cases in the community, for fully 50 per cent. of the cases reported by the dispensaries are not dangerous, having a negative sputum, and never become so. I am inclined to think that the number of deaths multiplied by three will give a fairly accurate statement as to the number of positive dangerous cases in any community. One thing is certain, our figures for 1912 show accurately that for every case that died, 2.1 new cases were reported. If we then consider that only 85.1 per cent. of all the cases are reported, it is shown that for every case that dies the accurate figure for new cases developing would be 2.5 cases, which corresponds fairly closely with Newsholme's estimate.

Space will not permit me to go into detail concerning the working of our Hospital Admission Bureau, or a discussion of the question of efficient nursing service. Suffice it to say that I am convinced that fully 50 per cent. of the so-called nursing work is just about as useless as anything could be from the standpoint of efficient, constructive social work and in so far as it has any bearing upon the handling of tuberculosis as a contagious disease. I do not favor replacing the nurse with the social worker, but I do insist upon a broader social training for the nurse.

Our experience goes to show that, in most instances, it is not the advanced case, visibly sick, helpless and bed-ridden, that proves the real menace in the home providing the nurse is visiting that home. In such instances, all the members of the family become sentinels. They can see the danger. It is the positive sputum case, still able to work, who refuses to believe he has anything the matter with him that is most dangerous, for such a case forcible detention in a hospital is the treatment. The time is fast coming when the Health Department will insist that the home condition of every tuberculous case shall come up to a certain standard and that assurance be given that the patient is intelligent and willing to coöperate in the protection of his family and his fellows. And these cases will of necessity have to be located earlier than they have been.

The question has been raised, "Is the time not right for the Health Department to declare tuberculosis an epidemic or pestilential disease?" For Health Departments, with perhaps one or two exceptions, to do so would be a serious mistake at this stage of the game. What is needed first is a development of a complete equipment in the shape of hospitals, sanatoria, dispensaries and nursing forces, with a record of cases and a knowledge of conditions, and then, with the support of an enlightened public and the coöperation of the private physicians, the Health Department will be in a position to put through with some degree of success a public health measure far-reaching in results.

CONCLUSIONS.

1. Tuberculosis, a contagious disease, can never be controlled by any private agency—every effort should be made to shift the work of private organizations to the Health Department.

2. By a centering of the work in the Health Department, not only is there immediately increased efficiency but, through coöperation with the other departments, one is in a position to attack the underlying causes that produce tuberculosis.

3. The time should be hastened when the Health Department will direct all work, medical and social, which has a bearing upon the public health of the community. Private organizations will through their coöperation make possible the development of new lines of work, duplication will be avoided, and more efficient and more lasting work will result.

THE PUBLIC DUMP AND THE PUBLIC HEALTH.

C. E. Terry, M.D.,
Jacksonville, Fla.

Read before the Municipal Health Officers' Section, American Public Health Association, Washington, D. C., September, 1912.

I have been instructed by the chairman of your Committee on the City Wastes, Including Nuisances, to discuss a certain feature of waste disposal under the head of nuisances.

That it belongs properly in this category I feel that there can be little doubt, and yet I find that the word itself is susceptible of almost as many definitions as there are exponents of the art of making clear.

According to Gould, a nuisance is "that which is noxious, offensive or troublesome, applied to persons or things," while the same author defines noxious as "harmful, poisonous or deleterious." Nelson becomes more personal and declares a nuisance to be "any unlawful interference with or in the enjoyment of a right of property." Webster denies final responsibility by quoting Blackstone as follows: "anything that worketh hurt, inconvenience or damage." Whichever definition we accept it is evident that nuisance has no friends; hard adjectives surround its mention and that we permit the existence of public conditions, deserving of the term, seems astounding.

Without virtue and of varied ill-fame as appears this word I feel that it still but incompletely describes the subject of this report, the public dump.

In its simplicity and carelessness, as a means of waste disposal, the dump probably dates back to the discarding of the first apple core in the Garden of Eden, and its subsequent train of evils is ample testimony of the Eternal wrath elicited by that act.

Age and custom, however, have not bequeathed it the respect usually accorded their possessor and, year by year, is greater discredit heaped upon it. Notwithstanding the frown of modern sanitarians the dump appears to exist in disquieting numbers.

A questionaire mailed to about ninety cities, of thirty thousand or more population, brought sixty-eight very interesting replies.

Of these thirty-nine dump refuse, waste paper, cans, etc., twenty-one employ incineration and eight dispose of it by private contract without describing final method.

The methods of garbage, kitchen swill disposal are described as follows:—

By means of cess-pools and sewers, four.

Incineration or reduction, twenty-three.
Feeding to pigs, twenty-one.
On public dumps, thirteen.
By private contract, undefined, one.
Dump at sea, one.

The thirteen cities that dump their garbage employ this as their sole method of disposition. The nuisance feature of the dump, however, is not covered by this comparatively small number, as fifty-nine admit maintaining dumps, only nine claiming to be without them. Further, of the fifty-nine cities which maintain public dumps, although only thirteen employ them as a sole means of garbage disposal, thirty-eight state that kitchen refuse finds its way to these places in greater or less quantities, six do not reply to this question and twenty-four state positively that only such refuse as cans, papers and other dry waste is so disposed of.

The greatest unanimity of opinion is observed in the replies received to the question, "Is the public dump a proper means of garbage disposal?" Sixty-four state emphatically, *no*, two are indefinite in their replies, one does not answer and one says, "Yes if it be covered with sand." In spite of this almost universal condemnation of the public dump we have seen that fifty-nine of these cities maintain them, notwithstanding the adverse opinion of the executive of the health department. A typical illustration of the indifference of the legislative branch, of the average city, to public health concerns.

In seeking an explanation of the wide prevalence of dumps, we find that of the sixty-eight cities from which replies have been received, that, while thirty possess either incinerators or reduction plants, in only sixteen of these is their capacity sufficient to the needs of the community, while fifty-two are compelled to dump at least a portion of their waste.

To its credit, be it said, that, the section of the country most adequately supplied with crematory facilities appears to be the Western, Middle Western and Middle Atlantic States as represented by California, Wisconsin, Indiana, Mississippi, Pennsylvania and Delaware. The New England and Southern States depend most frequently on the dump and pigs. Indeed, the pig fills a most important rôle in the municipal housekeeping of these localities.

The nuisance features of the public dump have been alluded to in the beginning of this report and it is safe to say that they are due, directly or indirectly, to the occurrence in these places of decomposing animal and vegetable matter. They are, "noxious, poisonous and harmful," and have been so considered, I am convinced, since the earliest days of the unabridged.

The reason for this damning opinion, however, has undergone a curious evolution under scientific scrutiny. As the older theories of disease etiology, from noxious gases, have vanished with the malarial Will o' the

Wisp miasma, we have been taught that in this putrescent mass there are to be found the larval forms of various insects, true carriers of disease.

At the last meeting of this Association, in Havana, I described some fly experiments which sought to demonstrate the remarkable ability of the fly, during its various stages, to migrate through a considerable depth of sand and, after maturity, to disseminate in its specks whatever infectious material it had fed upon in its larval state. In this connection, were made repeated inspections of various portions of the city dumps and fly larvæ were found at depths varying from a few inches to nearly two feet.

The Board of Public Works endeavored to keep these places covered with six or eight inches of clean sand, but, in view of the fact that we were able, without difficulty, to rear flies from eggs and larvæ buried under forty-eight inches of sterile sand, I was forced to the conclusion that there was no reason to believe that the myriads of larvæ contained in the garbage which found its way to these places, failed to reach the surface as mature flies. Most garbage is fly-blown before it leaves the can and I doubt it if be practicable to cover this material in such a manner as to cause these insects any inconvenience in their development. In direct proportion to their area I consider the public dump second to no other place as a fly-breeder. A further reason for their discontinuance are the recent developments in the plague situation, as they concern our Atlantic and Gulf seaports.

If the warning sounded in Havana and Porto Rico be heeded and permanent rat eradicative measures instituted, the public dump will have to go, affording as it does shelter and sustenance for unguessed numbers of these rodents. They swarm on them day and night and no methods, which do not provide for the elimination of these infested places will meet with more than a mediocre measure of success in deratization.

That the public dump *may* be innocent of some of these evils I will not deny. Adequate provision for the disposal of swill, watertight swill cans and a two- or three-way collection tend to minimize the nuisance of the dump, in direct ratio to the decree of their enforcement.

My questionaire shows that of the sixty-eight cities replying fifty-four require watertight, covered garbage cans. Thirty of these enforce the law, yet only twenty-seven collect kitchen swill separately, while, as already stated, thirty-eight admit that swill in varying amounts, finds its way to the dumps. Human frailty, individual poverty and official laxity must be reckoned with even under the most rigid enforcement of such laws, and to require of the householder a covered, metal can and then permit the dumping of its contents in a public place is obviously wrong. The accumulation of garbage in the home should be surrounded with every safeguard, especially in imperfectly sewered cities, where flies have access to human excrement, but these regulations, for the individual, must be accompanied by the adequate provision for the safe disposal of the city's waste. To the end that this may come to pass I believe that waste disposal should in every community be a branch of the health department. In no other way may its relation to the public health receive due consideration. In only twenty-seven of the sixty-eight cities replying to my queries is this the case and it is significant that garbage is incinerated or reduced in twenty-three. A number of the cities have qualified their answers by stating that dumps are utilized to fill in low and marshy places. It is a popular pastime of the Board of Public Works in my own city, Jacksonville, to reclaim low lands for parks and playgrounds, in this manner. Such an object may, in some measure, justify the dump, but I doubt if it be sound economy. Of what use to decry the uncovered garbage can, to enforce a stable ordinance, when, in a dozen different directions, the municipality is maintaining fly, rat and other vermin hatcheries, sufficiently fertile to supply the entire city. The crematory facilities of my own city are measured by an old, low temperature Dixon, which stews along, devoid of incinerating instincts, and, in almost every section is to be found at the far end of a green park, a malodorous dump, which unfailingly furnishes a swarm of flies for those residing in its vicinity.

The housecleaning of San Francisco has taught us more than the practical control of plague, for, coincident with its progress has been noted a marked reduction of other infectious conditions, not, heretofore, attributed to rat dissemination, but due, probably, to insect or animal carriage at present unexplained. It must be remembered that only cities of over thirty thousand have been dealt with in this report. In the smaller cities and towns conditions are probably far worse, while, in the country we reach the trash pile by the kitchen window, the dirt floor stable and the open privy or "back lot," the last step in sanitary depravity.

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ENLIGHTENED PHILANTHROPY.

Of particular interest to all those concerned in the public health movement is the recent announcement of a gift by Mrs. Elizabeth Milbank Anderson to the New York Association for Improving the Condition of the Poor for the foundation of a Department of Social Welfare. Sums totalling $650,000 are guaranteed to the Association for carrying out the purposes of the donor.

It is not often that a public benefaction is conceived on the broad lines and with the appreciation of fundamental factors that characterizes the terms in which the offer is conveyed. While recognizing the necessity of relief activities, it is stipulated that the new department shall concern itself with a social program based upon preventive and constructive measures. "Generally speaking," says the letter transmitting the offer, "this program should include those activities which are calculated to prevent sickness and thus diminish poverty; such, for example, as the promotion of cleanliness and sanitation and aid in securing a proper food supply. In this connection the Association will doubtless find it advisable in some cases to co-operate with public authorities and with existing agencies with similar objects in view, where such agencies are practicing approved methods in fulfilling their purposes, while in other cases it may probably be necessary to establish the work as a new enterprise, and, in still other cases, it will perhaps be prudent to devote some time and money to investigation and research before assurance can be given that any proposed measure can accomplish the object sought to be attained."

With the funds so provided it is announced that at least three sub-departments will be created, one on Public Health and Hygiene, one on the Welfare of School Children, and one on Food Supply. It is clear that the opportunity is provided for positive contribution to the solution of the social problems, not only of New York, but of all other crowded centers of population.

To the readers of this JOURNAL probably the most interesting item in the gift is a fund of $50,000 for the scientific investigation of the whole problem of ventilation. It is proposed to name a commission of experts in the various sciences closely concerned and to place the amount named at the Commission's disposal for strictly experimental work with the expectation that in the course of a few years systematic research will solve some of the most fundamental of the questions, inability to answer which has placed the problem of ventilation in the chaotic condition in which it now finds itself.

We have witnessed committee after committee inquiring into the subject, but always reporting its findings as incomplete on account of lack of knowledge of the basic factors involved. From various technical organizations have come pleas for adequate funds with which to pursue laboratory research in this field. Now for the first time a relatively adequate sum is available without restrictions.

We shall await with much interest the naming of the Commission and with still more eagerness the results which may confidently be expected within the next five years.

In the mean time, we congratulate the New York Association to which this opportunity for constructive steps in public health work has been afforded.

THE BOARD OF HEALTH NURSE: WHAT SHE CAN DO FOR THE PUBLIC WELFARE IN A SMALL CITY.

J. Scott MacNutt,
Health Officer, Orange, N. J.

Read before the Municipal Health Officers' Section, American Public Health Association, Washington, D. C., September, 1912.

Public health problems in the past have been chiefly attacked through control of the environment. This method involved many true principles and has brought about a cleaner, safer world. Nevertheless, accumulated facts clearly indicate that even the most efficient surveillance of the environmental factors alone still leaves half the problems of prevention unsolved. What is now needed is a greater degree of attention to the individual and his manner of life.

Consider that greatest single responsibility of boards of health—the prevention of tuberculosis. Improved housing and factory conditions, greater municipal cleanliness, purer food and water supplies, and reduction of dust in the streets, when first inaugurated did much to bring about a marked and steady diminution in the disease. But the march of the great "captain of the men of death" was only checked, not halted. In spite of all, infected persons expelling large numbers of germs continued to act as potent foci of infection, while well persons living in apparently satisfactory surroundings continued to fall victims. Even the multiplication of hospitals failed to remedy this state of affairs, for these could accommodate but a small fraction of the infective cases. Regulation of the environment had reached its limit. But the root of the problem has now been located: in the ignorance of patient and public as to the nature of the disease and the failure of the individual—the well, but more especially the sick—to apply certain simple prophylactic principles.

Consider another problem, which rivals in importance that of tuberculosis—the prevention of infant mortality. I need not review its extent, summarized as it is in the facts that 10 to 15 per cent. or even more of the infants in our cities die before reaching the age of a single year, and that on the best authority at least 50 per cent. of these deaths are reasonably preventable. The recognition of these facts, at least in a general way, is not new, nor have attempted remedies been wanting. Institutional care was early looked to for aid, but this disappointed hopes as a means of general and successful application. The first remedy of a truly preventive character was improvement of public milk supplies. Great things were expected of this, and great good was actually accomplished, but still the problem was solved only in part. It was then seen that the innermost difficulty lies at the point where all factors, and not simply one or two, converge,—in the direct hygienic care of the child by the mother. Again, as with tuberculosis, the personal factor in the home is the all-important one, compared with which the external advantages and disadvantages are secondary.

So in both tuberculosis and infant mortality problems we see that the same element of personal prophylaxis lies at the center of all factors. If all tuberculosis patients and their families could be taught and persuaded to act as their own sanitary police, and if all mothers could be instructed to apply a few fundamental rules in the care of their infants, the remaining cares of the sanitary authorities in these matters would be secondary. Hence the remedy: *personal instruction in the home.* The individual is the center where public and personal hygiene meet and mingle. Health authorities should therefore seek to utilize every means of influencing the hygiene of private life where it has a public bearing or tends to nullify the benefits of public sanitation. Of such means direct personal instruction is the very chief. Where sanitation of the environment halts because it cannot go further there is still need for instruction which will enable people to make the most of that environment. Where the law stops, instruction begins. The situation is perfectly summed up in the Earl of Derby's dictum: "Sanitary instruction is even more important than sanitary legislation."

Now, as to ways and means. How is instruction best to be carried into the home? First of all the physician has always been, to a greater or less extent, an educator in matters of hygiene public and private, frequently to his patients and occasionally to the general public. But the demands of practice, the infrequency of his visits in the families which need constant preventive information, and the fact that his chief interest is in curative medicine, make it necessary that prevention be assumed almost entirely by the public health authorities. The individual and family now get less preventive instruction from the busy doctor, while every day the complexity of life demands more. The general publicity of the health department does not fill the needs of the individual case. In order to meet the demand of the day the health authorities must put into action another factor. That factor is the board of health nurse.

The nurse, acting upon the official information and with the prestige of the health department, goes into the home. There her first duty is inspection. Her observation as a trained worker will take in all the details of home, surroundings, and person which are essential to a right judgment of the case. She fills out a standard card with accurate statements of these things for record. The various conditions—housing, cleanliness, intelligence, economic standing, etc.—may conveniently be graded, as accurately as possible, into certain arbitrary classes indicated by the letters "A," "B," etc. Artificial as this may at first sight seem, it is of great value both in everyday practice and in working up statistical results. Experience shows that a workable but full system of records, even though very imperfect, should be kept from the very start. To "show good" is as important as to "make good," especially when there arises the question of securing financial support.

The second duty of the nurse is supervision, both of the person and of his surroundings. In tuberculosis supervision of the patient is very essential and involves every move made by him as well as his immediate personal conduct. Care in the disposal of sputum and proper segregation and treatment are the chief items. The tuberculosis nurse brings to bear the resources and agencies which may be of use, always having in mind chiefly the safety of the community, but also the welfare of the patient. In the supervision of the surroundings the nurse's field is wide. She should have all the powers of a sanitary inspector for entering premises and examining into possible unsanitary conditions. She must be familiar with the laws and ordinances touching such conditions. As a sign of authority and a protection she should be provided with a distinctive badge. She will report dark and dirty tenements, windowless rooms, breeding places for flies, and in general secure the best surroundings that the sanitary ordinances can demand.

Finally, as the chief function of the board of health nurse, comes instruction. This, as already stated, is essentially preventive in nature and hence is for the well as much as for the sick. The associates of the tuberculosis patient as well as the patient himself are instructed how the disease may be avoided. Well babies, quite as much as sick ones, are kept under observation. At her command should be all the information of the health department regarding the qualities of the various milk supplies. She teaches the home modification of milk for infants, and the proper care of milk in the home, without which the best milk inspection is rendered valueless. But prescribing of formulas or medicines, and actual nursing care and relief work are beyond her field; these must be referred to other agencies.

It must be remarked here, in passing, that a misunderstanding may readily arise from the use of the term "nurse." In common usage the word of course implies manual service—actual nursing. Such is the work of the "trained" nurse and of the (also "trained") "district" or "visiting" nurse who performs nursing service in the poorer districts. Now the board of health nurse, as has been seen, has no such function, but quite a different one, of preventive instruction rather than alleviation or cure. Yet her present titles are more than likely to create confusion in the popular mind. This is accentuated by the fact that the board of health nurse and her privately maintained sisters doing similar work are trained nurses to begin with and are frequently called "visiting" nurses. There is certainly need for a new and distinctive title. The term heading this paper is distinctive but lengthy; besides which, instructional work is at the present time more frequently than not performed by nurses under the direction of private organizations. The same may be said of "public health nurse." Perhaps on the whole the simplest and best name for the new recruit to the army of public welfare workers is that of *health nurse.* This has at least the merit of brevity and of indicating that the positive promotion of health, rather than actual nursing and cure, is her weapon against disease. Anti-tuberculosis nurses and infant welfare nurses may have their specific titles, but all may be called "health nurses," while the general term is essential where one nurse carries on the two kinds of work.

The work of the health nurse in a small city will, as already implied, fall in general into two classes: prevention of tuberculosis and of infant mortality. In the smallest cities, say of not much over 10,000 population, one nurse may cover both fields; in the larger there will be two or more, devoted to their special objects. Details of procedure, based upon the simple outline which has been given, are beyond the scope of this paper. One point, however, is worthy of special notice,—that her work will be very diversified and that she will touch the life of the community at many points. If she is caring for babies she will be the first defence against ophthalmia neonatorum and blindness of infants. The importance of this single incidental fact is vast. A nurse working under the observation of the writer discovered two unreported cases of ophthalmia, saw that they received such treatment as saved the eyesight (obtaining the aid of district nurses for the purpose), and later furnished evidence on which the midwife was fined for failing to report as required by state law in cases of sore eyes.

She will have a close observation of midwives and their methods and will exert an educational influence upon the many who are careless or ill-educated. It frequently happens that half the deliveries are attended by these women, without any systematic inspection of their work. The nurse may discover and report for prosecution illegal practice of midwifery or medicine of which the authorities would otherwise have no suspicion; and these evils go on to a greater extent than is generally supposed. When such things as these develop, as they surely will in the practice of an alert nurse, they must be called more than incidentals.

The board of health nurse in either phase of her work will be constantly in touch with the bureau of charities to refer to them families needing aid, with the city physician to secure medical service for the poor, with the visiting nurses' settlements, with hospitals and dispensaries, and with other agencies too numerous to mention. Her influence in the home will touch all sides of domestic hygiene. Where the power of the sanitary inspector leaves off, her influence begins.

I have dwelt at some length on the nature and value of the work of the health nurse because I believe that these things are not recognized as they should be. In the larger cities of the country the nurse is a familiar associate of the health officer and the social worker, but in the smaller cities this is not at all the case. There she has yet to come into her own. Contrary to the usual impression (even perhaps among health officials themselves), there is a particular need for the health nurse among the small cities of the country.

That such a need exists, frequently in an aggravated degree, is readily understood from simple considerations. Tuberculosis, for example, thrives best under urban conditions—poor housing, economic pressure, poverty, overwork, alcoholism, and the congestion which means lowered vital resistance and ready modes of infection. It is also under such conditions that the greatest ignorance as to the disease is encountered. Infant mortality is greatest under the same circumstances. But the significant fact is that such conditions are by no means confined to the large cities. On the contrary they may, and frequently do exist in small centers of population. In a village of a dozen or so dwellings clustered about a mill or factory all the unfavorable features of typical big city congestion frequently appear. The situation is the worse where modern sanitation has not yet come upon the scene. No community is free from this danger; unawares many have fallen into it; and these range all the way from the factory hamlet of a hundred to the city of a million.

Nor are these considerations without statistical confirmation. A casual glance at, say, Table 3 of the United States Mortality Statistics for 1910 will show numerous instances of very high death rates from tuberculosis among the smaller cities (*i.e.*, of from ten to fifty thousand population). This is true of any region where industrial demands have given rise to sanitary problems. My own city, of 30,000 people, has as heavy a tuberculosis death rate as the neighboring city Newark, of ten times the population; and this is due chiefly to the presence of a predisposing industry, hatting, and a large factory element. Unfortunately, infant mortality figures must be based upon birth returns, which can be thoroughly relied upon in so few cities that such figures are not available, but they may certainly be expected to show similar phenomena.

All this goes to shows that it is the small cities, rather than the larger which are already started along right paths of prevention, that must awaken to their problems. It is surely one of the greatest needs of today that the public health methods and organization that have proved their worth in the larger cities should be extended to the smaller. Too often some disastrous epidemic of typhoid or of scarlet fever is required to bring about reorganization of a backward régime. Little of course can be accomplished without an efficient, full-time health officer appointed for a four-year term or more and supported by adequate financial means. And among the foremost of his instruments in the attack on the vital problems mentioned will be the health nurse.

As to the plan of campaign, there is no safer principle to follow than that of concentration and thoroughness. Experience shows that the natural tendency to spread over as large a territory as possible is to be guarded against. Regarding matters of organization, reference may be had to two stimulating papers by Professor Selskar M. Gunn: one on modern board of health methods in small cities and the other upon the study and prevention of infant mortality in such cities.*

All educational endeavor works slowly, though none the less certainly. The work of the health nurse is no exception. Immediate results in the ordinary mortality figures cannot be expected, and fluctuations due to climatic, sociological, and other factors may be expected at times to mask the good accomplished. On the other hand, detailed study more readily throws light upon progress. In Orange we found that the first year of the infant mortality work resulted in a statistically corrected death rate among the infants under observation (practically only midwife cases) of only half that of the infants in the city as a whole. Yet that same year the general infant mortality rate, evidently affected by unusually trying weather conditions, rose from 110 to 139. The tuberculosis death rate during the years that the nurse has been at work has shown marked decreases below those which would normally have been expected. And in all this not the least gratifying phase has been the practically universal welcome which these nurses have received from the public and the confidence which through their tact and usefulness they have inspired.

Finally, a survey of the fields of tuberculosis and infant mortality prevention leads to the conclusion that, for the highest efficiency, all the diverse agencies involved must be correlated under the health authorities. Under our democratic and anti-paternal customs of government the value of new enterprises for public welfare must first, apparently, be demonstrated through private initiative before official powers and moneys will move. Public responsibilities are frequently pointed out by private philanthropies. And the official powers require more than demonstration; they require the insistent demand of the public. In this fact lies half the philosophy of campaigns of publicity. The history of tuberculosis work is a familiar example of these things, and the organization for prevention of infant mortality stands now where the former stood a decade or more

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*"Modern Board of Health Methods in Small Cities," published in the JOURNAL of this Association for May, 1911; and "An Outline for the Study and Prevention of Infant Mortality for Boards of Health of Small Cities," *Bull. Am. Acad. Med.*, December, 1910.

ago. The charities have done admirable work, but it is due time, particularly in the small cities, that the public authorities assume the bulk of the burden.

Consultation and milk stations, tuberculosis hospitals and dispensaries, are best operated and maintained by the health department; and these should be regarded as profitable municipal investments, as benefits which the community may expect from its government and for which the public through its taxes should pay, rather than philanthropies. The registration of births and deaths, I scarcely need say, should invariably be controlled by the health department. Too frequently these important records which form the basis of vital statistics—the bookkeeping, as has been said, of the health department—are kept by another city office which cannot be expected to take an interest in their statistical value, and are seen at rare intervals, if at all, by the health officials.

There will always be plenty of room for private endeavor in the solution of these public health problems. The health officer cannot look for control of all the agencies, and he must be constantly in coöperation with the charities which will do much to lighten his labors. But these should all take their places in a general organization scheme of which the board of health is the head. And in all this *the health nurse*, the means of central correlation, will be the most essential single factor.

DISCUSSION.

DR. G. W. GOLER, *Rochester:*

I rather agree with most of what Mr. MacNutt has said, but I think the work of the health nurse is something quite different from what Mr. MacNutt has spoken of. I think the business of the board of health nurse is to help in the work of the making of a social survey in the town in which she lives. Not only is she to aid in the problems relating to the prevention of tuberculosis and infant mortality, but to try to find out for us the habits and manners of the people—things such as these: what are the housing conditions of the people of her town? What is the average wage received by the people she visits? What percentage of that wage is expended by those people in rent? How many children are there in a given family under fourteen years of age and how many over fourteen? How many of the children over fourteen are engaged in gainful occupations? What do they get and how many are there in family?

I think it must be perfectly plain that the health nurse can do very little for the prevention of ophthalmia neonatorum. She gets in, as a rule, altogether too late for that, but she can find out how many children are born in the family, and she can, by verification of the records of vital statistics, find out whether these births have been recorded.

We have endeavored in Rochester to make a social survey of this kind with the aid of a few health nurses that we have. We know, for instance, what the average income is in 500 families; it is about $10 a week. We know that 26 per cent of the income is paid for rent; that nearly 10 per cent of the children recently born were not placed on the health register two years ago. I think it ought to be the business of the health nurse to ascertain these things, so that we may have the beginning of a social survey of the health of our town, and so that we, as health officers, may know something about the sociology of the town in which we live.

Dr. C. H. Landis, *Cincinnati:*

There is just one feature of this paper that I would like to speak about, and that is the work of the nurse in preventing blindness. In Cincinnati, through the generosity of the Society for the Welfare of the Blind, a nurse has been placed at the disposal of the health department. This nurse devotes her time entirely to people who have some affection of the eyes. Her duties began the first of July last year. During that time she has investigated every midwife in the city. Through a large number of organizations, cases are reported to this Society for the Welfare of the Blind, and this nurse visits all of these cases. Through her work and through the work of the Society, we have been able to save about a dozen children who have ophthalmia neonatorum and who were in charge of midwives. I regret to say that the only case of blindness we have been able to discover that has occurred because of ophthalmia neonatorum was due to the failure of the physician in charge to properly treat that case. The work as it has been done in Cincinnati absolutely proves the value of the nurse in preventing blindness from ophthalmia neonatorum. Through the evidence that she has been able to gather, we have prosecuted probably six midwives in police courts for failure to report those cases as required by our law. All of these midwives have been fined by the police court judge. Within the last six weeks, by his direction, all the midwifes in Cincinnati were called into the police court, the law was explained to them and they were given to understand by the judge that the first case of ophthalmia neonatorum in the care of a midwife not reported to the Cincinnati Department of Health would result in a workhouse sentence.

Dr. Delamater, *Kansas City:*

There is one feature of nursing that has not been touched upon in the paper by the gentleman, and that is the Visiting Nurses' Association. In quite a good many cities they have a Visiting Nurses' Association which is kept up by subscriptions or donations from philanthropic people. Then, in addition to the Visiting Nurses' Association, we have the Nurses of the Department of Health, who go out and do health work and also visit the public schools. In our home city, I have felt that it is a duplication of work and an interference with the work of the board of health nurse, to have two separate organizations. My idea has been that it would be much better to take the five or six nurses that are now working under the Visiting Nurses' Association and place them under the Department of Health. The school nurse in Kansas City, unfortunately does not get the salary that is due her. There again comes in politics and the disposition of the finances by the aldermanic body. Our nurses receive less money than the visiting nurses. The salary of the visiting nurses starts off at $60 a month and car-fare. She has a badge that entitles her to ride upon the street cars. Our nurses do not ride upon the street cars unless we furnish the tickets for them. Now, if we had the Visiting Nurses' Association under the Department of Health, paying them an adequate salary and giving them the badge that the visiting nurses are now entitled to, it would be much better for them and we would get more results than we are getting today. We have the Visiting Nurses' Association telling the department of health that they have a case of chicken-pox or a case of smallpox, as happened the other day, which proved to be multiple ring-worm. Had it been one of our nurses, she would have known it was a case of multiple ring-worm and not smallpox. So I believe the Visiting Nurses' Association of the city should come under the department of health and they should be known as health nurses.

In regard to ophthalmia neonatorum, we have not had many cases in the city. We have only eight midwives in a city of 300,000 and we have a very small foreign population. As I stated here the other day, out of a total birth registration of 4,720, we had 331 delivered by those eight midwives, so that the midwifery question is *nil* with us, we haven't much to do with it. Now, in speaking about the midwives—we had one negro woman who came to make application for a permit to practise and we promptly turned her down. Doctor Terry of Jacksonville says you can talk to the negro and she will say "yes sir," "yes sir," but that is all it amounts to. We have found in our work, the health nurse work, that the negro woman is very anxious to learn all she can in regard to the keeping up of her health and that of the children, so that we have at present, two white and one colored nurse, the colored nurse working in the lower quarters of the city, and this year we have taught those people to modify the milk. Last year we supplied in those quarters modified milk in bottles. This year we went into the homes and the colored nurse taught these mothers how to modify milk, so I believe the greatest good in health nursing would come from the Department of Health if the other agency, the Visiting Nurses' Association, was thrown over to that department.

DR. GUY L. KIEFER, *Detroit:*

I rise to endorse the paper that has just been read by Mr. MacNutt. I have felt for some time and I feel it very strongly, that the larger the number of intelligent, level-headed graduate nurses that a health officer has in his employ for the purpose of instructing the public in the prevention of communicable disease, the better will be the results. I think that what Mr. MacNutt said would apply to the large cities as much as the small ones. The work with which Doctor Goler is connected is good work. It depends on the city, whether that work should be done by the nurse under the Health Department or the Department of Charities. It seems to me that that work would come under the Department of Charities, in our city. At any rate, not taking issue at all with that kind of work, I do believe that the principal work that the nurse should and can do is the work pointed out in the paper. It seems to me that the name given her by a former president of this society, in which he called her the "instructive nurse," is the proper name. That carried with it what we mean. I am very strongly in favor of the employment of more nurses to teach the public how to prevent the spread of communicable disease.

DR. HASTINGS, *Toronto:*

I wish to say a few words by way of emphasizing the value of the nurse to a department of health. However, I think Doctor Kiefer is wise in emphasizing the importance from an educative standpoint. A very large proportion of the work of a department of health, if it is going to be efficient and permanent, must be of an educative character. In Toronto we have a division of tuberculosis and a division of child and infant welfare. In connection with the division of tuberculosis, we have seven nurses under one supervising nurse. We started twelve months ago with a hundred and seventy odd cases reported; we now have over a thousand families visited by these nurses, in which there is one or more cases of tuberculosis. I feel that their work along the line of tuberculosis alone has more than paid and more than justified and warranted the expenditure. I do not think there can be any second opinion about the nurses being under the department of health. The nurses in connection with the department of health in Toronto have full police powers given to them and they are practically sanitary inspectors. I don't know what influence the public health act has in other parts of the country, but if it has the same influence and is the same slogan in other parts of the country as it is in Toronto, I think it is extremely important that a nurse doing work in connection with any municipality should feel that she is backed up by the public health act and the department of health.

I will give you a little illustration of the influence and feeling in regard to the public health act so far as Toronto is concerned. A predecessor of mine many years ago was reproached by one of the aldermen for being a little severe in ordering him to remove a nuisance, and he was quite indignant to think that he, a representative of the city in the council, should be ordered the same as the ordinary layman would be. However, he consulted the city solicitor and he was a very practical sort of a man. After listening to him for a little while, he said "Did the medical health officer tell you to do that?" "Yes." "Well," he said, "All I can tell you is that if the medical health officer tells you to go to hell, you've got to go." Therefore we feel that it is extremely important that what we do along that line should be done by the nurses under the department of health, and we care little or nothing for by-laws, we act under the public health act.

Dr. Woodhouse:

Coming from a city somewhere near the size of Orange, where Doctor MacNutt came from, we have had experience with the board of health nurse also. We have a population of 21,000 of which 7 per cent. is foreign. We found, in the settlement of this foreign proposition, that in one year, by a house-to-house visit of the health nurse, we were able to register fifty-three babies that had not been registered by priest or physician. I think we have had some results in the reducing of infant mortality and summer diarrhea. We are working along those lines and most of the credit is due to the visiting nurse. In 1910 we had, in June, July and August, sixty-three deaths from summer diarrhea, we had twenty-two in 1911, and six in 1912, during the same months and that is due to nothing else than the visiting nurse.

Mr. MacNutt: Orange, N. J.

One of the speakers stated that he had six nurses that he believed should be placed under the health department. I think that the problem in a great many places is how to get this work done, whether done by the health department or someone else. In my own community, which is an example of a great many, the work is not done by the board of health, so far as support is concerned. We have two nurses, one for tuberculosis, the other for infant mortaltiy, both supported by private organizations. That brings me to this point, that where the work is done by private agencies, the health department can get a great deal of work done simply by coöperating with those agencies. In a good many cities it is unfortunate that there is enmity perhaps, or at least coldness, between the department of charity and the health department, but if the health department and the department of charity will only get together and the health department will appoint the nurse as a sanitary inspector and the department of charity will provide the financial support, a great deal of benefit can be reaped.

SOME NEWER PROBLEMS AND SOME NEWER PHASES OF THE ANTI-TUBERCULOSIS WARFARE IN THE UNITED STATES.

S. Adolphus Knopf, M. D.,

Professor of Medicine, Department of Phthisiotherapy, of the New York Post-Graduate Medical School and Hospital: Associate Director of the Health Department's Clinics for Pulmonary Diseases: Visiting Physician to the Riverside Hospital-Sanatorium for the Consumptive Poor of New York City.

Read before the American Public Health Association, Washington, D. C., September 19, 1912.

About two decades ago, when the sanatorium movement in Germany and in the United States received its greatest impetus from the results obtained by Dettweiler, a pupil of Brehmer, and by Trudeau, many believed that the problem would be solved if we could get enough sanatoria to treat the early cases, retain them there six months or a year, then send them out again to the ordinary walks of life making room for new ones.

Future cases of tuberculosis we thought we could prevent from developing, or at least diminish in number by our knowledge of the behavior of the tubercle bacillus as the direct agent of infection and propagation. Effective sanitary measures to prohibit the spread of tuberculosis by indiscriminate expectoration we thought the most essential measure. For a number of years after Koch's declaration at the London Congress in 1901, the transmissson of tuberculosis by the bovine type of the bacillus was considered improbable, or at least of minor importance, until new evidence brought forward by various investigators, particularly English and American,[1] proved beyond a shadow of doubt that tuberculosis is caused in childhood in from 5 to 10 per cent. of cases by the ingestion of milk from tuberculous cows. New bovine laws were created or the older ones more rigorously enforced, yet as far as the United States is concerned, the peculiar situation arising from the absence of a federal department of health and the lack of uniformity or total absence of bovine laws in some of the states of the Union, must be held responsible for the great prevalence of tuberculosis in childhood due to the bovine type of the bacillus. Thus, one of the first newer problems, or let me rather say, most important problems, is to do away with this source of tuberculosis in childhood. How bovine tuberculosis can be successfully combated among our milch cows is a topic with which you expert sanitarians are familiar and your experience in this work exceeds mine many times, but I know you will agree with me that without a federal department of health, without uniform bovine laws and federal authority to enforce them we are powerless.

Milk inspection, pasteurization, the grading of milk, and milk standards, are subjects likewise so often and well discussed in this society that I do not feel I can add anything new, except to express my belief that with our present knowledge pasteurization is a necessity for protecting the general milk supply particularly of a large city, from the germs of tuberculosis and other infectious diseases.

There is, however, one feature which seems to me deserves mentioning under new problems. I refer to the likelihood of infection from tubercle bacilli in butter. Investigations in this[2] and foreign countries by competent men have shown a rather frequent occurrence of tubercle bacilli in butter, and while it may be difficult to trace infections arising from this source, the presence of the tubercle bacilli in any article of food substance demands serious attention. The relatively small number of bacilli ingested with butter may not be injurious when not repeated, but Hess has shown that partaking daily of milk containing small numbers of tubercle bacilli may cause infection when the same quantity taken in one dose failed to produce tuberculosis.[3]

Because it is exceedingly difficult to examine all the specimens of butter coming to the market from sources where milk inspection is lax, obligatory sterilization of all cream destined for butter production, as is the law in Denmark, would seem the only method to do away with this source of infection from bovine tuberculosis. Here, again, we see the great and urgent need of a Federal Department of Health to protect the public.

The marriage of consumptives and whether they shall be allowed to procreate, is a problem which has received some serious attention of late. It is a subject large and important enough to be treated by itself, so I will now merely express my personal opinion on the subject as I did in a recent communication, entitled "Primary Sources of Tuberculous Infection and Their Relation to Eugenics."[4]

Our social reformers tell us: The first thing you physicians must do is to prevent the tuberculous from marrying. This is more easily said than done. Certainly we know there are a number of states in which a certificate of health is demanded before a license is issued, and recently some brave clergymen, foremost among them the Very Rev. Walter Taylor Summer, of the Protestant Episcopal Cathedral of St. Peter and Paul of Chicago, have declared that they would bar all marriages unless the couples were armed with a physician's certificate saying that they have no trace of insanity, tuberculosis, or other communicable disease. If I have the quotation correct, I would object to the wording of this declaration, for, if the reverend gentleman really means that he will not marry anyone who has even a trace of tuberculosis, he will have a chance of performing the ceremony relatively rarely. What the old German Geheimrath said many years ago still holds good. I refer to the often quoted words, "Am Ende haben wir alle ein bischen Tuberkulose," which might be freely translated; taking all things in consideration, perhaps every one of us has or has had at some time or other a little tuberculosis.

A mere trace of tuberculosis should not bar anyone from marrying and propagating, but with a distinctive lesion, likely to become acute at any moment, or with a very strong predisposition, marriage and procreation should be deferred until the prospective husband or wife is cured. I cannot speak for the experience of others, but as for myself in years of consultation practice, I have had occasion to prohibit marriage a good many times. Sometimes, those who had sought my advice obeyed it, more frequently they did not and I have come now to the firm conviction that neither state law, clergyman's protest, nor physician's advice will prevent people from coming together as husband and wife if they want to. I grant that there are exceptions, but these exceptions are few.

A somewhat easier task is it when we are confronted with a tuberculous married man or woman whom we desire to convince that as long as he or she is acutely ill with the affliction there must be no children. Such advice the average tuberculous patient is willing to take, but obviously failures are frequent.

It would seem that the time had come for dealing more radically and energetically with this phase of the tuberculosis problem. I plead for vasectomy for all tuberculous male patients who are willing to submit to this operation. I should make this operation obligatory for anyone who is acutely tuberculous and insists upon marrying. I would insist upon the ligation of the Fallopian tubes for all female patients in the same situation. I would teach even slightly affected tuberculous parents or married people, not only all the details of prophylaxis so that they may not infect each other, their children, or others, but should make it also a sacred duty to teach them how not to procreate while either one of them is acutely afflicted with the disease. To this end I should go so far as to urge that parents, even when they feel themselves apparently well and strong and recovered from a tuberculous lesion, not to decide on having a child without both submitting themselves to a careful physical examination. Only when found in really good health, as a result of a careful examination by a competent practitioner, should they feel that they have a right to procreate.

My studies in tuberculosis have also taught me another interesting fact which will justify the legitimate prevention of conception in tuberculous parents and the too numerous children to parents inclined to tuberculosis. In taking the history of tuberculous patients I have made it a practice for years always to ascertain the size of the family from which the individual comes and whether he was the first, second, third, fourth, fifth, etc., born of the family. This careful history-taking has revealed the fact that the great majority of tuberculous individuals coming from large families were the younger ones. It is nearly always the later born who contract tuberculosis.

There is no doubt in my mind that perhaps the age of the father, but most frequently the system of the mother worn out by repeated pregnancies, has contributed to the physiological poverty of that later born child. The child comes to the world handicapped physiologically. In many instances when the family, because of the number of children, has been reduced to a state of relative poverty, the later born children cannot receive or have not received either the good care or the good food which was given to the first born at a time when there were not so many mouths to feed. This condition might be considered the sociological reason of the child's predisposition to tuberculosis, added to the physiological causes above described. I have in my records a number of such later born individuals who had become tuberculous in adult life when there was no tuberculosis in their family, but the personal history revealed nearly always a state of health below par from early childhood and the sociological study of the family a relative poverty.

It would not do, before an audience of this kind, to deny the possibility of direct bacillary transmission through the placenta. These cases are rare, it is true, but they occur, and they occur perhaps more frequently than our statistics seem to indicate.

Recognizing the physiological poverty which a tuberculous parent transmits to the offspring, the economical disadvantage of large families of the poor, the possibility of direct bacillary transmission and the almost certain post-natal infection of tuberculosis from close contact of the child with its tuberculous parent during the early years of life, who is there who would venture to say that the prevention of conception under such circumstances is not a sacred duty?

Concerning another phase of the problem under discussion, that is to say the advisability of emptying the pregnant uterus of a tuberculous woman, each case must be judged according its own merits. Heretofore, I have assumed the attitude of non-interference in early or very moderately advanced tuberculous cases of pregnancy; but I am willing to confess that I am more and more inclined to the emptying of the uterus in all cases where a positive unhealed tuberculous condition exists. I do not stand alone in this seemingly radical attitude. Schottelius and Schaute, in a recent very instructive article on "Abortus artificialis und Tubensterilisation wegen Lungentuberkulose" (Beiträge z. Klinik d. Tub., Band 20, Heft 2), have to come the conclusion that in view of the uncertainty of the prognosis in a tuberculous pregnancy the emptying of the uterus is indicated in every case. Carefully gathered statistics show that in 75 per cent. of positive cases of tuberculosis the pathological process increases rapidly during pregnancy, and particularly after delivery, toward a fatal termination. When, after careful counsel with a competent consultant for internal diseases and an experienced obstetrician or gynecologist, the diagnosis of tuberculosis and pregnancy is certain, the careful and aseptic emptying of the uterus by an expert is virtually connected with no danger. The non-interference means a mortality of 75 per cent. of the mothers and the birth of a tuberculous or predisposed child. It goes without saying that in the majority of these cases the ligation of the Fallopian tubes at the same time or soon thereafter to avoid further pregnancies is indicated.

Prevention of a tuberculous conception, the limitation of children in a tuberculous family, the emptying of the uterus of a tuberculous mother, otherwise doomed if not to an early death to prolonged invalidism, the prevention of tuberculous or predisposed children coming to the world not only handicapped by disease, but also by poverty and want and sure to become a burden to the community, is not race suicide but race preservation.

Until such a time as the radical procedures which I have just outlined will become universal we must have maternity sanatoria where we must isolate and treat hygienically and dietetically all such cases in which prevention and the emptying of the uterus has been neglected. In such maternity sanatoria the mother and her offspring should be treated at least six months before and six months after childbirth.

All children under five years of age who react to the von Pirquet test have, as a rule, a more or less active tuberculous process. In these little ones there has not yet been time to produce an absolute latency of the contracted infection. The von Pirquet test is absolutely inoffensive and I suggest to sanitarians and particularly to lawmakers who have the condition of the nation's health at heart, to make this test obligatory for every child at the ages of 2, 3 and 4. I predict that this measure, which reveals a diagnosis of tuberculosis often difficult to make in children by mere physical means, if followed up by immediate and effective treatment, will prove one of the most successful features in our endeavors to combat tuberculosis.

For the benefit of those who may possibly object to this seemingly radical procedure, I will merely state that the von Pirquet test for tuberculosis rivals, if it does not surpass, the vaccination for smallpox in simplicity and inoffensiveness, and surely the parent who consents to have his child vaccinated for smallpox will not object to an equally simple procedure as a means of saving his child from becoming a victim to tuberculosis.

The need of both seaside and inland sanatoria for the treatment of children afflicted with the various types of tuberculosis is an urgent one. There is hardly any community in the United States which could claim sufficient facilities for the treatment of its tuberculous children, and yet the prognosis of these children when subjected to aero helio therapy is most favorable. It is to the treatment in the open air, to the exposure of light and the rays of the sun that we look for the best result.

Careful studies by Hoobler* and others of the effect of cold air on the blood pressure of tuberculous children show that when a patient is transferred from a warm hospital ward to the open air there is always a gradual increase of blood pressure. If the patient is placed out of doors the pressure soon reaches its normal limits and remains at that point as long as the outdoor life is kept up. It is well known that in nearly all tuberculous children the blood pressure is considerably below the normal.

Open-air schools for tuberculous and predisposed children cannot really be considered a new phase of the anti-tuberculosis warfare. On the other hand, those of us who know the relative scarcity of such open-air schools and who know the invaluable benefits which can be derived therefrom, must wonder why open-air instruction is limited to the few classes in primary schools. I feel so keenly on this one phase of the tuberculosis problem that I have made it the subject of an entire paper which I intend to read before the Congress on Hygiene and Demography which will convene next week in this city.

The equipment of these open-air schools, the cost of feeding, medical supervision, etc., have been so often described that I will not enter into consideration of these subjects; suffice it to say that it pays in the end in health, happiness and economic gain to take care of these children at the right time and in the right place.

Besides the two types of outdoor instruction (outdoor classes in regular school buildings for the predisposed and outdoor schools for those afflicted with open tuberculosis), there should be that type of schools which are known in Germany as "Waldschulen" (schools in the forest or woods). They are, of course, mainly feasible in summer, but will be of inestimable benefit to the nervous, anemic, scrofulous, or poorly nourished children, all of them strongly predisposed to tuberculosis. To possess a system of such Waldschulen or vacation schools should be the ambition of every city. All these types of schools should be multiplied manifold. I go so far as to say if we really mean to wipe out tuberculosis among the coming generation, open-air schools and open-air instructions should be the rule, indoor schools and indoor instructions the exception. If, as has been proven, when the child handicapped by so serious a disease as tuberculosis, anemia, or scrofulosis, is instructed in the open air, it not only holds its own, but often does better work than the healthy child raised and instructed indoors, what may we not hope for from outdoor instruction given to the child throughout its school career? And in school career I include a kindergarten course. Because this latter institution rarely has a medical inspection unless it is attached to a public school where the school physician is on guard, it is to my mind a fruitful source of the propagation of infectious diseases. Most frequent of these are the mysterious colds which the little ones bring home, and which upon investigation it is shown that all children have. I am convinced that the open-air kindergarten would do away not only with these so-called colds (which are infectious), but would also diminish the number of other infectious diseases children are so prone to.

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* *Journal of Obstetrics*, October 1912.

I am very glad to be able to state here that according to the latest statistics kindly transmitted to me by Dr. Farrand, we have now in the United States 200 open-air schools. While this constant growth is gratifying in the extreme, the number of open-air schools must be many times multiplied in order to accommodate the 600,000 school children in this country who are afflicted with tuberculosis.

The city of Boston seems to be particularly energetic regarding open-air instructions. Its School Committee passed last November the following resolutions:

"Ordered, That the Schoolhouse Commission be requested, so far as feasible, to provide that all rooms in new school buildings shall, on one side at least, open wholly from floor to ceiling to the outer air, in order that during warm weather, at least, the pupils may have as much fresh air as possible."

And now a word about instruction in the open air in higher grades, that is to say, in high schools and colleges. I am aware, of course, that a number of branches in the curriculum of the high schools and colleges cannot be taught outdoors or in an open-air class, but many branches can, and I know from personal experience and from the report of army surgeons in Germany that the recitation and singing in the open air is most conducive to health, the development of sound lungs, and a well-formed chest.

Let instruction in the open air be carried out more universally in high schools and colleges for men and women whenever feasible as well as in primary schools, and I guarantee a stronger and better race physically within a decade, with no intellectual impairment whatsoever. I go even so far as to venture the statement that, if studying mostly in the open air makes it possible for the tuberculous child to accomplish as much and more in shorter hours and shorter sessions, the hours and sessions for the normal pupil of the primary school, high school and college may also be shortened by this hygienic mode of studying and teaching.

To exclude young children and undeveloped children from the burdens of wage-earning industries.

To forbid employment of all children and youth in industries which menace life, health and morals.

To limit the hours, forbid night work and otherwise guard the conditions of children and youth who may be employed.

To promote the efforts of the public schools to meet the recognized needs of an industrial civilization.

These are the aims of the National Child Labor Committee as set forth in a recent announcement. Need I say that unless these conditions are realized in all our states, tuberculosis in childhood and adult life will never be eradicated from our midst?

Read the latest Child Labor Bulletin of August, 1912, published by the National Child Labor Committee, 105 East 22d Street, New York, and you will be amazed at the diversity of laws concerning child labor in the various states. How inefficient, how little protective, and even how dangerous they are in some! I cannot too strongly urge all those interested (and everyone should be), particularly our statesmen, to work for the universal adoption of a uniform child labor law, such as is so ably outlined by Mr. Lovejoy in the above mentioned Bulletin, and which was adopted at the twenty-first annual meeting of the National Conference of Commissioners on Uniform State Laws (August 25 and 26, 1911).

The examination of employees in offices, factories and workshops is not an entirely new feature in the anti-tuberculosis crusade, and I mention it simply because it is as yet far from being a universal practice. The need of such procedures has been eloquently set forth in Dr. M. G. Overlock's book, "The Working People, Their Health and How to Protect It." In Dr. Theodore B. Sachs' paper, read before the meeting of the National Tuberculosis Association in Washington, May 30, 1912, a very carefully outlined plan for the examination of employees for tuberculosis has been presented. If every employer of a large body of men could only realize what it means morally and even financially to all concerned to have his employees examined for tuberculosis and, when found afflicted, treated and cared for, he would soon follow the example of the few employers who are now doing this life-saving work. It is interesting to note here that one of our greatest life insurance companies—the Metropolitan Life Insurance Company—has gone so far as to establish on Mount McGregor near Saratoga a special sanatorium for its tuberculous employees. The report of this company's success as a business corporation would certainly show that the unusual care for the welfare of its employees and the consequently increased efficiency of the employees pays in the end.

In a very interesting address recently delivered before the Life Underwriters Association of Canada, Mr. Haley Fiske, Vice-President of the

Metropolitan Life Insurance Company, very pointedly speaks of the immeasurable value of welfare work for the employees of insurance companies and other corporations with a view to fighting tuberculosis and of a notable victory which was obtained by the Metropolitan Life Insurance Company in acquiring the legal right for the directors of any insurance company to establish a sanatorium for its tuberculous employees. There was a question of an insurance company having the legal right to spend money for the care of sick employees. To quote Mr. Fiske: "The Superintendent of Insurance, while sympathetic with the enterprise, doubted the power of the corporation to undertake the establishment of such a sanatorium. The question went to the Supreme Court of the State of New York; the decision is emphatic and comprehensive. The court said:

"The duties of the employer to the employee have been enlarged in recent years, and are not merely those of the purchaser of the employee's time and service for money. The enlightened spirit of the age, based upon the experience of the past, has thrown upon the employer other duties, which involve a proper regard for the comfort, health, safety, and well-being of the employee. . . . It is well within the corporate power to assume, as it has done, the care and treatment of such of its employees as are afflicted with tuberculosis. And unless it is shown to be wasteful of the company's money and unproductive of beneficial results, the practice may stand as well within the scope of the business. The reasonable care of its employees, according to the enlightened sentiment of the age and community, is a duty resting upon it, and the proper discharge of that duty is merely transacting the business of the corporation."

Mr. Fiske continues: "And the court held that such care is not a gratuity, but is regarded as additional compensation. Thus, not only every insurance company, but every corporation, now has the duty imposed upon it to take reasonable care of its sick employees. Not the least service performed by the Company has been the obtaining of this decision. The judgment has the support of public opinion. We hope our example in the care of agents will be followed not only by every company represented at this convention, but by every corporation employing labor. The directors have the power and have imposed upon them the duty to use the money of the policyholders and stockholders to care for the employees."

The one suggestion I would wish to make regarding this subject is that where employers alone may not be able to undertake preventive and curative tuberculosis work, employers and employees should unite in a mutual enterprise to insure the employee at least against tuberculosis. Since our political situation makes it seemingly impossible, for the time being, to have anything in the line of a national insurance act such as England is now blessed with, and which marks the beginning of a new era in the campaign against tuberculosis in that country, we must be satisfied with voluntary schemes in the same direction which are feasible at this time.

How this may be done has been very ably outlined by Lee K. Frankel, Ph. D., an authority on life insurance and welfare work of employees and now assistant secretary of the Metropolitan Life Insurance Company. In his very admirable paper on "Insurance Against Tuberculosis," read before the Sixth Annual Meeting of the National Association for the Study and Prevention of Tuberculosis, in May, 1910, Doctor Frankel says:

"Existing agencies, such as labor unions, fraternal orders, establishment funds, and insurance companies can materially enlarge their present sphere of activities by adding to the sick or death benefits which they give special treatment for consumptives, either through physicians, nurses, or in sanatoria. Whether cash benefits can be given during invalidity is a question of obtaining a morbidity experience, and the ability of the members of policyholders to meet the necessary charges. In addition, any of the above-mentioned agencies may coöperate with anti-tuberculosis associations in the United States, or on their own initiative may undertake a campaign of education to instruct their constituencies regarding the care and prevention of tuberculosis.

"Sickness insurance even on voluntary lines has had but very limited development in the United States, aside from sporadic efforts made by labor unions, fraternal orders, and mutual benefit societies connected with industrial establishments. Any concerted and comprehensive attempt to introduce sickness insurance is as yet unknown. Any such effort on the part of a municipality, such as has been developed in Leipzig, Dresden and Vienna, has not even been thought of in the United States. It is true that the splendid development in these cities is primarily due to the fact that the majority of members of the sickness societies are required by law to be insured. It may be assumed, however, in view of the enlightened public sentiment developing in the United States, and the efforts that are being made on all sides to fight tuberculosis, that municipalities and towns might organize similar insurance societies either against sickness generally or tuberculosis in particular. There are reasons to believe that cities, through taxation, might accomplish the same results as those obtained in Leipzig and Dresden. The right of a municipality to tax its citizens is not denied. It is not stretching the imagination too far to suppose that a municipality might impose a tax upon its citizens, which tax should be used specifically for the cure of sufferers from tuberculosis, and to carry out preventive measures for the eradication of the disease. Such a tax might be imposed on the basis of wages, and be apportioned among employers and employees on the assumption that in dustry to some extent is responsible for the spread of tuberculosis. The taxes thus collected might be set aside in a special fund to be administered by a board of directors made up of representatives of labor and capital, similar to the organization of the Leipzig sickness society. The problem of the care, treatment, cure and prevention of tuberculosis would be placed in the hands of the board of directors."

Doctor Frankel, in mentioning the fact that these same schemes, when proposed thirty years ago in Europe, were thought visionary, yet today they are accepted without cavil and are in working operation in many countries with the approval of the government, employers and employees, then goes on to say:

"The day must come when these insurance schemes will receive recognition in the United States. The day has gone by when social problems may be considered purely from the standpoint of philanthropy. It is contrary to an orderly scheme of things to permit individuals to work under evil conditions, to receive insufficient wages, to subject themselves to disease, and to expect that they shall be satisfied, when they suffer from accident or disease, to receive as a privilege the dole which charity or philanthropy is permitted to hand to them. Germany realizes that the State has distinct obligations toward its citizens. Not the least of these is protection against the risks of life and health incidental to our complex industrial development. It is realized that the workingman alone cannot protect himself against the contingencies of life, particularly against sickness, accident, old age, and unemployment, and that opportunity must be given to him, through some insurance plan, to realize that these contingencies, when they arise, will not deprive him of the means of livelihood. Tuberculosis as a social disease must be considered as one of these contingencies. As a social disease it is recognized that its causes in many instances are obscure; that its effects are far-reaching and affect not only the individual, but the community.

"That it is possible to devise an insurance scheme to meet the exigencies arising from the results of the disease there can be no doubt. Of more importance, however, is the conception that in such a scheme there shall be the opportunity to prevent tuberculosis. Precisely what system may be finally adopted in the United States is still problematic. That the subject is worthy of the consideration of the best minds and the best thought goes without saying."

Although insurance against tuberculosis has not yet been effected by any of the United States life insurance companies, to the credit of the officers of a number of these companies it must be said that they are doing invaluable work in the prevention and cure of tuberculosis among their policyholders by a most efficient educational campaign. The Postal Life Insurance Company of New York even grants periodic examination to their policyholders, as stated in Dr. Eugene L. Fisk's admirable address on "The Physical Welfare of Policy-Holders and What Life Insurance Companies Can Do to Increase it."[5]

The Equitable Life Assurance Society of the United States publishes quarterly an interesting magazine under the name *The Human Factor.* Its mission is to serve the officers, employees, and policyholders of the Equitable company, and humanity in general, by stimulating interest and action in the conservation of life and of life insurance. It is also designed to supply an attractive and instructive medium through which the members present and prospective may keep in touch with the management and with the progress of the society. The same company has an admirable Department of "Conservation" under the directorship of Conservation Commissioner E. E. Rittenhouse.

The Metropolitan Life Insurance Company, because it cannot yet take care of its tuberculous policyholders in its own sanatorium, furnishes cards to all policyholders to forward to the district office in case of sickness. Let me quote again regarding this valuable work from Mr. Haley Fiske's above mentioned address: "The agents, on their calls for premiums, look out for cases of sickness. The nurses visit the office, receive the cards, interview the agents, and calls are promptly made. First aid is furnished, the patient is made comfortable, and where necessary the family physician is called, if there is one, or a dispensary or public physician interested where there is no ability to employ a doctor. The nurse then places herself under the direction of the physician and calls as often and stays as long as necessary. Sometimes a call or two suffices; but the number of calls upon a patient has been known to be nearly one hundred. No charge is made, no deduction made from claims. About a million visits are made a year, in about 1,100 cities and towns, at a cost of about half a million of dollars. The nurses employed are, whenever possible, those belonging to local associations. Where associations are not available the company employs its own nurses. Tuberculosis, pneumonia, bronchitis, influenza, typhoid fever and, among children, measles, diphtheria and paralysis are the principal diseases treated." All these diseases predispose strongly to tuberculosis, and it must be obvious that this is most efficient anti-tuberculosis work. Its value is doubly enhanced by free distribution of the appropriate anti-tuberculosis literature issued by the company. Thus, for example, an illustrated pamphlet has been circulated printed in ten languages, to the number of four and a half million copies and entitled "War upon Consumption." A supplementary pamphlet containing a list of tuberculosis sanatoria, hospitals, dispensaries, classes and associations in the United States and Canada, was prepared and circulated in the hope that many sufferers would be directed to places of treatment. Another pamphlet followed, entitled "Directions for Living and Sleeping in the Open Air." It contained directions for making cheap shacks for roofs, porches and open spaces, and for window-tents in rooms, with illustrations.

To the student of the causes of tuberculosis as a disease of the masses, the housing of the masses will always be of greatest import. It has always seemed to me that the tuberculosis problem cannot be solved without improving the housing conditions of the poor and the moderately poor, and so I feel that among the newer factors which will be helpful in the solution of the tuberculosis problem in the United States I must mention the invaluable work of the National Housing Association which was founded in New York City a little over a year ago with Mr. Rovert W. De Forest, the President of the New York Charity Organization Society, as president, Mr. John M. Glen, Director of the Sage Foundation, as treasurer, and Mr. Lawrence Veiller, former Deputy Tenement House Commissioner, as director. The following are the objects of the Association which speak for themselves:

1. To improve housing conditions, both urban and suburban, in every practicable way.
2. To bring home to each community the importance of right housing conditions and the consequences of bad ones.
3. To study in various cities the causes of the drift of the population into the cities, and the methods by which the population may be distributed over larger areas.
4. To encourage the formation of improved housing associations where they do not exist, and to aid in the work of all such associations by advice and direction.
5. To act as a clearing house of information for such agencies, and to furnish advice and suggestions to those interested in housing reform, and generally to promote popular interest in the subject.
6. To aid in the enactment and enforcement of laws that will
    a. Prevent the erection of unfit types of dwellings;
    b. Encourage the erection of proper ones;
    c. Secure their proper maintenance and management;
    d. Bring about a reasonable and practicable improvement of the older buildings;
    e. Secure reasonable, scientific and economic building laws.
7. To aid in defending such laws when once enacted, from the attacks of adverse interests, and in correcting them from time to time to suit changing conditions and meet new needs as they develop.
8. To train and equip workers for the various places of housing reform work.

A part of the anti-tuberculosis warfare, which as a whole is as yet sadly neglected, but which in numerous instances could be carried out at once, is teaching the tuberculous or the predisposed families the invaluable practice of outdoor sleeping. The little device known as the window-tent, which it was my privilege to bring before the profession some years ago, and the numerous similar arrangements suggested and manufactured since then, are suitable and applicable to nearly every home; for even the poorest they should be made common, particularly for people who are obliged to work indoors during the day. More elaborate devices, such as sleeping porches, sleeping balconies, wall-tents, starnocks, etc., are more adaptable to individual homes.

The National Association for the Study and Prevention of Tuberculosis, realizing the inestimable value of outdoor sleeping at night, recently instructed its assistant secretary, Thomas S. Carrington, M. D., to gather material and study the various methods of outdoor sleeping for the purpose of writing a popular book on the subject. The book is entitled "Fresh Air and How to Use it." It is to my mind one of the most valuable contributions to this phase of our tuberculosis warfare. This volume of 250 pages, with 150 excellent illustrations, is sent to all the members of the association, and non-members can procure it at the low price of $1.00, including postage, by writing to the Association, 105 East 22d Street, New York, or through any bookseller. A smaller pamphlet on the same subject, similar to the one mentioned under the Metropolitan Life Insurance Company's literature, can be obtained free of charge by writing to the Association's executive secretary, Dr. Livingston Farrand, 105 East 22d Street.

To plead for more institutions for the treatment and care of early cases is, as I have already stated, not new in the anti-tuberculosis campaign. But we have of late years become even more cognizant of the fact that institutions for the treatment and care, or we might say with equal emphasis, the isolation of advanced cases, particularly of the vast number which live under the most deplorable hygienic condition constituting an almost certain menace to their kin and neighbor, is of paramount importance if we desire to effectually combat tuberculosis.

The following table, recently published by Doctor Biggs, shows that the mortality from tuberculosis in 1911 was as follows:

	1901		1911	
City	General Death Rate.	Tuberc. Death Rate.	General Death Rate.	Tuberc. Death Rate.
Paris	18.2	4.32	16.7	3.59
New York	19.91	2.29	15.13	1.76
Boston	19.87	2.36	17.08	1.55
Philadelphia	18.26	2.23	16.50	1.87
Chicago	13.93	1.42	14.55	1.66
London	17.24	1.81	12.71	1.14
Berlin	18.00	2.18	14.65	1.78

The mortality from tuberculosis in the United States has been estimated by various experts to be about 200,000 per annum. From observations in cities where the most careful tuberculosis statistics are kept, as for example in Cleveland, Ohio, it has been positively shown that to every death from tuberculosis there are eight living tuberculous invalids capable of propagating the disease unless they are conscientious and trained in prophylactic measures or segregated in institutions. In our estimates for the care of tuberculous patients who are in need of institutional care we have made heretofore the number of deaths the basis for our calculations. One of the newer conceptions in the anti-tuberculosis problem must be to multiply by eight the number representing the deaths in order to know what we really need in the line of providing proper home or sanatorium care for our fellow citizens afflicted with tuberculosis.

In the United States we have at this time 525 hospitals and sanatoria for the tuberculous, representing accommodations for about 30,000 patients. Although hopeful and inspiring when compared with conditions of 20 or even 10 years ago, this number still offers only a drop of relief in an ocean of woe.

Poverty seems responsible to a very considerable degree for the prevalence of tuberculosis. The New York Association for Improving the Condition of the Poor has just announced the result of the investigation of 6,565 families that sought aid of the association between October 1, 1911, and June 30, 1912. Of this number, 1,605 sought aid because of illness, and the illness in 555 families was tuberculosis. This would indicate that 8 per cent. of the destitution in the homes of the city during the above-named period was due to tuberculosis. The association says that some effective plan of home treatment must be found, because it will be many years before there will be enough hospitals to accommodate all the tuberculosis patients. A comparison of the hospital provisions in the United States with the needs and growths of population shows that the demand is increasing twice as fast as the supply.*

London offers the lowest death rate of the world's great cities. The isolation of advanced cases to which our English co-workers attach the greatest importance, is said to be responsible for this remarkably low death rate from tuberculosis.

You are perhaps familiar with the very effective work which Mr. Homer Folks, this year's president of the National Association for the Study and Prevention of Tuberculosis, has done in the capacity of Secretary of the State Charities Aid Association. The Committee on Tuberculosis of this Association has worked and is working for the establishment of a tuberculosis hospital for advanced cases in every county of the State of New York. Mr. Folks expresses the hope that by 1915 there will be no uncared-for tuberculous individual in the State of New York.

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* The State of New Jersey recently enacted a bill entitled "An Act Concerning Tuberculosis" (Chapter 217, Laws Session of 1912) which in its provision for hospital facilities is the most advanced and efficacious thus far enacted by any State.

I do not know if Mr. Folks includes the City of New York in his prophetic hope, his activities having not taken in the metropolis. Be this as it may, years of experience as senior attending physician to one of our largest tuberculosis hospitals in New York City, where the vast majority of patients are advanced cases, has taught me another new phase of the tuberculosis problem connected with the care of the tuberculous poor in the latter stages of the disease where isolation would seem imperative.

We now have in a few states of the Union, as we have in New York City, a law whereby the consumptive, considered a menace to his fellowmen, can be forcibly removed to one of the tuberculosis hospitals. The respective paragraph authorizing the removal of such patients is found in the Sanitary Code, Section 139, and reads as follows: "Whenever an inspector of this department shall report in writing that any person sick of any infectious disease, under such circumstances that continuance of such person in the place where he or she may be, is dangerous to the lives of other persons residing in the neighborhood, the sanitary superintendent . . . upon the report of the medical inspector of the Department, may cause the removal of such person to one of the hospitals under the charge of this department or to a hospital delegated by the Board of Health."

To the best of my knowledge there are at this moment neither in the City of New York nor in any other of our larger cities sufficient accommodations to thus seggregate all those who by reason of their environments ought to be placed in hospitals.

Why is it that so many patients must be forced to go to the hospital? Why do they not go voluntarily? Why do so many who go voluntarily become discontented and long to go back home where the hygiene and food may be poor and medical care wanting entirely?

Instead of enumerating all the objections which I have heard from patients or friends of patients, and the reasons why the latter do not wish to go or do not wish to stay in the hospital, let me suggest at once the remedies for this situation and then you will perhaps realize with me that it is indeed a new phase which we campaigners in the anti-tuberculosis warfare must consider very seriously.

The great educational campaign has taught the consumptive and those living with him that a hospital for consumptives means a place to die in; a sanatorium a place to get well. My remedy for this is to call the institution in the city or near the city, destined to take care of advanced cases "sanatorium-hospital" or "hospital-sanatorium." Because the advanced cases among the poor consumptives in large cities are numerous, the existing institutions are often overcrowded. Old, former general hospitals are used for the care of such cases, and because of the seeming hopelessness of many of them relatively little care is bestowed upon all. If we wish to attract the advanced cases to such hospital-sanatoria we must above all make the place attractive, even beautiful. We must bestow upon our consumptive poor, though they are no longer in the incipient or early stages, the same care and comfort which are given to the well-to-do who are received in many private sanatoria in the advanced stages as long as they are able to pay. The disease in some advanced tuberculous cases can be arrested, in many their lives can be prolonged and made comfortable, and in not a few instances even an economic * cure can be accomplished.

(*To be concluded.*)

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* By economic cure is to be understood a condition in which the disease has been sufficiently arrested to allow the trained patient to take up some occupation whereby he can earn his livelihood without aggravating the relatively quiescent stage of his disease and, of course, without endangering those with whom he has to work and associate.

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THE STANDARD METHODS FOR THE BACTERIOLOGICAL EXAMINATION OF WATER. A PROTEST AND A PLEA.

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Most of our American water analysts will agree with the position taken by Professor Whipple as expressed in his paper "The 37° Bacterial Count"[1], that the radical change in the standard methods for water analysis proposed by the committee is most unfortunate and unwise, but it is hoped many will not agree that it is a weighty argument in favor of the 37° count that this method is more convenient than counts on gelatine at 20°.

As the matter now stands an analyst engaged in routine work and following the standard methods may feel perfectly justified in making counts only on agar at 37° and cultures in lactose-litmus-bile. Both tests are similar in the main, and their results comparable.

Although it is conceivable that the proposal of the committee, that hereafter account be taken merely of organisms growing at blood heat, emanated from men interested chiefly in pathology and epidemiology it is beyond belief that water analysts of experience should be willing to ignore the invaluable information obtained from gelatine plates at 20° C. It is to be devoutly hoped that the majority of water analysts in our Laboratory Section believe with the writer that a decidedly backward step has been taken and will voice their opinion in no uncertain words, for it is not the 37° agar count only, that is open to serious question.

The difference of opinions as to the choice of methods of procedure for the bacteriological examination of potable waters turns upon the fundamental question—What is the true objective in the great majority of such investigations? If it is merely to arrive at a decision as to whether *active, vigorous,* bacterial organisms of the colon and allied groups are present, possibly pathogenic to man at the particular time the samples were taken, then doubtless, we must admit that the simplified and curtailed standard methods may and usually will fulfil the requirements. But if we take the broader and saner view that the analyst owes to his client and to the public a reliable opinion as to the true character of the water whenever possible, its present condition, what has taken place in the past and what may happen in the future; then, under the proposed change, we fail absolutely. As water analysts charged with the responsibility for sanitary advancement, we can never dodge these questions, nor can we by setting up false standards ignore that the fundamental issue is one of *clean* water. Given a clean water we can be reasonably sure that the water will be safe, but given a water simply known to be free from fecal organisms, we are forced to confess ignorance of its safety, and sooner or later the value of our so-called standard methods will be called in question. The writer fully realizes that this is a Cassandra-like appeal, but there is little doubt that the tendency toward undue simplification will be the wooden horse which will eventually bring discredit and disaster.

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[1] This Journal, January, 1913, p. 36.

The chief claims for the change made by the committee may be said to be that agar plates at 37° C. will yield results in twenty-four hours as against forty-eight hours required by gelatine, and that growths following an incubation at blood heat yield information more representative of dangerous conditions. In a general way these claims contain an element of truth, but it must not be forgotten that in certain liquid media bacteria will develop at 37° even more rapidly than in nutrient agar and that by a proper series of dilutions quantitative results may easily be obtained, and this in from eight to twelve hours. Subcultures made from these will yield information as to the nature of the flora present sufficient for an interpretation of the character of the pollution. Moreover, liquid media are more easily and quickly prepared, and if the argument holds good that gelatine is unsatisfactory, its preparation time consuming and further that gelatine plates require twice as long a period of incubation as agar, then we should discard agar in favor of liquid media, and yet it is doubtful whether such a proposition would be seriously considered, though as far as pure water analysis is concerned it would be wiser than the elimination of gelatine. "But," it is said, "gelatine does not give the total number of bacteria in the water." In answer to this it may be pointed out that this same line of argument holds good for most of our chemical determinations in a striking degree, as for example, nitrogen, as free, and as albuminoid ammonias, in neither case do we expect to obtain the total nitrogen present in the organic matter, neither do we expect to obtain a measure of all the organic matter present by a determination of oxygen consumed, nevertheless the data obtained in these determinations have been of invaluable service, and few analysts would be willing to discard them, with no substitutes, simply because their results are not absolute measures of constituents.

The diagnostic value of gelatine is not to be ignored. At the present time it is in reality the only method we have at our command for easily differentiating between a number of great groups of organisms. Even in the event of the investigator not being able to assign specific names to the organisms forming the colonies he sees, with a little experience he soon learns to recognize the bacterial flora associated with different environments and he interprets the results of his examination in the light of this acquired knowledge. Gelatine at 20°C. discloses to him a far greater number and variety of bacterial forms than does agar at 37°. The diagnostic value of agar as compared with gelatine is so low and so well recognized as to need no further comment, and if we are therefore compelled to make subcultures from our agar plates, upon which to base a diagnosis we are no better off, so far as time is concerned, than if we had employed gelatine plates at the start.

In routine work the analyst using only agar at 37° fails to obtain the very marked seasonal variation in the character of the bacterial flora of a water supply and those important changes in this flora due to meteorological conditions. Neither is he able to differentiate between a surface water and a ground water flora or what is substantially the same thing surface soil and deep soil flora. True, it may be argued that information of this sort is not utilized in questions involving the potability of a water, nevertheless, it ought to be, and if obtainable, materially contributes to a better and sounder interpretation of the results of a complete sanitary examination.

Standard methods of analysis should of necessity be compiled *especially with respect to the needs of the inexperienced worker.* There is, therefore, grave danger in any attempt to curtail the number of tests or determinations to be made simply to shorten work or because a certain method is easier, when more work or longer processes will yield results upon which greater dependence can be placed.

The sanitary expert of many years of experience needs no such guide, he will make all the tests necessary in order to arrive at conclusions which will not jeopardize his reputation.

With the increasing density of population the menace of water-borne disease and the danger of filthy water-supply surroundings becomes greater year by year. Extra effort is required to maintain *clean* water. The responsibility for this maintenance rests largely upon the shoulders of the sanitarians of our country. Every attempt to read into the methods of water examination assumptions which will tend to lessen the protection of the public or will tend to pass unclean filthy waters must be deprecated.

The giving of an opinion as to the potability of a water is a serious matter; upon it not infrequently depends the health, if not the lives of many men, women, and children, yet we water analysts take little thought of the responsibility we shoulder. In the diagnosis of a case of obscure illness the physician is supposed to call to his aid all that modern medical science furnishes him; if he fails to do so and errs in his judgment, he will be charged with incompetency or perhaps even with malpractice, but if in diagnosing the character of a water, an incompetent or lazy analyst cuts short his investigation and is guilty of an error of judgment he may be able to justify his position by the claim that "standard methods" were employed.

In the first case the health of a single individual was involved, in the second that of a community.

The value of gelatine counts at 20°C. becomes a matter of paramount importance in the control of water purification plants and there are few conscientious men in control of such plants who should be willing to endorse any proposal to cancel this method of control from our "standard methods" until something better is obtained.

In water purification plants of the rapid American type using coagulants it has been the experience of the writer that gelatine counts afford the only safe measure of the care and thoroughness of the filter attendants. Actually both gelatine and agar plates should always be employed if we wish sufficiently complete data for the proper management of a plant.

In order to ascertain the true value of the 20° gelatine count in comparison with the 37° agar count the author has consulted the records of two plants which have been under his supervision for a number of years. The number of days per month when agar plates gave a zero count were set down, and for the purpose of easier comparison these were calculated to per cent. of the total number of days (average twenty-five) per month effluents were examined. The results thus obtained are shown in the following table:

PER CENT. DAYS WHEN AGAR PLATES AT 38° STERILE. 48 HOURS.

		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average per Year.
1905.	Plant No. 1...	12	10	8	38	17	13	12	44	28	17	26	17	20
1906.	Plant No. 1...	30	33	57	91	34	35	24	34	41	73	92	85	52
	Plant No. 2...	23	16	14	24	7	26	46	50	50	65	83	95	41
1907.	Plant No. 1...	70	68	56	95	84	100	67	71	100	64	90	94	79
	Plant No. 2...	72	73	52	83	65	93	76	69	100	77	71	88	76
1908.	Plant No. 1...	85	90	85	95	91	5	15	33	56	0	13	27	49
	Plant No. 2...	86	100	95	100	88	21	12	6	16	13	40	66	53
1909.	Plant No. 1...	20	30	15	57	16	14	0	..	33	40	28	13	24
	Plant No. 2...	28	4	3	16	8	14	0	..	0	50	30	..	15
1910.	Plant No. 1...	8	13	37	50	20	12	0	0	0	3	8	3	13
	Plant No. 2...	5	8	12	20	4	11	0	4	15	51	60	..	16
Average.........		40	40	39	68	39	31	23	34	40	41	49	49	40

Plant No. 1 is that of Cornell University, treating from 350 to 420 thousand gallons per twenty-four hours. Plant No. 2 is that of the City of Ithaca, whose rate during the period covered has been from 1,200 to 2,200 thousand gallons per twenty-four hours. In both plants "basic aluminum sulphate" is employed as coagulant. Both are of the so-called "mechanical" type. In January, 1911, hypochlorite treatment was introduced in Plant No. 1, hence the results obtained cannot be compared with those of the preceding six years and have not been tabulated.

The table shows in a striking way that on approximately 40 per cent. of the days in the year these two plants yielded effluents having zero counts on agar at 37°–38° at the end of forty-eight hours, or in other words, these plants on this basis had an average indicated bacterial efficiency of 100 per cent., ten days in every month during the six years, while in the case of certain individual months, *e. g.* June and September, 1907 and February and April, 1908, every day sterile agar plates were obtained. Gelatine plates at 20°C., however, show no such excellency of operation, from 200 to 500 colonies per cc. on gelatine at 20°C. when there were zero on agar per cc. are not infrequent in the case of the improperly washed filters during the period tabulated, and with several cases of 1,000 to 2,000 and one case of 13,500 colonies per cc. on gelatine and zero on agar on the same identical samples.

It appears quite obvious, therefore, that with Central New York waters, and there is no reason for an assumption that these are radically different from those of other similar regions, agar counts at 37°–38°C. are not to be depended upon in the control of water purification plants. This does not imply that they are valueless; far from it, for a study of the table will at once demonstrate their value, but what is more important is that it indicates the necessity for *both* gelatine and agar counts.

Agar counts at 37° appear to be a very close measure of the prevalence of certain types of soil bacteria, and high counts, less a case of seasonal flora variation than one of meteorological conditions affecting the transportation of soil bacteria to the water through run-off or under-drainage. Excessive temperature or drought or rain, a matter of variation in different years, correspondingly affects the relation of counts on gelatine and agar. This effect of meteorological conditions is strikingly indicated in the results shown in the table for the year 1907. In spite of these yearly variations it is curious that in a given period including several years the per cent. of days when sterile agar plates were obtained is almost constant month by month.

Besides this variation in seasonal count there is a most marked seasonal variation in the species present in the water, and this variation in species appears to be identical in character with that in the soil as shown by investigations made in the Cornell University laboratories over a period of years. A discussion of this phase of water bacteriology is foreign, however, to the present paper.

The introduction of this table in the paper and the few remarks made upon it is justified as further evidence to show that what we now most need is a satisfactory system of thorough examination in the bacteriology of potable water and that the enumeration of tests to be made should be as complete in its way as the listed standard determinations made in a chemical examination, where the plea of convenience and cost in time, money and special apparatus has not yet been loudly raised, and would not be entertained as justifiable, and further that the source of the bacterial species found in the water be ascertained and their significance determined.

What is true of filter effluents appears to be true for other water examinations so far as the failure of an agar count at 37° to give proper information as to the true quality of the water is concerned. Out of some 1,700 miscellaneous waters (not filtered) consisting of surface waters, well and spring waters, my records show that approximately 15 per cent. had less than one colony per 2 cc. on agar after forty-eight hours incubation at 37°–38°C. In a number of samples there were several thousand colonies on gelatine when the agar plates were sterile and in one case a polluted water (not with sewage) gave 60,000 colonies on gelatine at 20°C. but none on agar or other media at 37°.

In other words, were the procedure recommended by the Committee on Standard Methods followed, the analyst in Central New York would be able to form no idea as to the true character of the water in at least 20 per cent. of the cases, this means that fully one-fifth of his reports will be faulty and afford little *future* protection to his clients.

By way of further emphasizing the inadequacy of agar counts alone, attention may be called to the following case, one of many which might be cited. The analysis is given in full.

	Parts per Million.
Color	None
Turbidity	None
Odor	None (?)
N. as free ammonia	0.030
N. as albuminoid ammonia	0.010
N. as nitrites	None
N. as nitrates	2.580
Oxygen consumed	0.190
Chlorine	4.200
Total solids	140.0
Loss on ignition	45.5
Alkalinity	120.0
Mineral acid hardness	17.6
Free carbon dioxide	4.3

Colonies on gelatine in air at 20°.C........72 hours......180 per cc.
Colonies on gelatine in H at 20°.C........72 hours..... 70 per cc.
Colonies on agar in air at 38°.C..........72 hours..... 1 in 2+ cc.
Gas producers,—none in dextrose, none in lactose, no change in lactose-neutral red or in lactose-litmus-bile.
Hydrogen sulphide production very weak from 100 cc. samples.
Indol production very weak from 100 cc. samples.
Dextrose broth plus phenol, 100 cc. samples, sterile.

Little evidence of an unsatisfactory state of affairs is indicated by the chemical analysis. In the bacteriological examination agar counts showed organisms growing at blood heat in about the proportion of 1 to every 2 or 3 cc. of water. Fecal and intestinal organisms were absent in volumes up to 100 cc. Upon this evidence the water in question would have been reported as eminently satisfactory. But the character of the flora on gelatine proved this to be erroneous. The facts concerning the sample are as follows. A group of springs was being pumped and the water forced through a mile-long pipe line by a centrifugal pump to a second pump station, where a Worthington pump sucked upon the line. The pipe line itself lay in a swampy ditch beside the railroad tracks of two great railroads. The colonies on gelatine plates though few in number showed a large percentage of surface soil and swamp water forms which would not have been present were the water merely that from the springs. A report was therefore rendered that the pipe line was in an unsatisfactory condition, that in all probability there was a leak in the line not far from the second pump station and that there was grave danger of contamination and possible infection from the many passing railroad trains. This opinion the municipal authorities refused to accept, saying that the analysis indicated a water of excellent character. When, however, the ditch dried up some months later, air entered the pump and after the check valves became sufficiently battered to allow back pressure, a jet of water, escaping fountain-like, demonstrated the existence of a split flange.

The question raised by the writer,—What is the true objective of the water analyst?—is clearly here before us in actual practice; should he have simply reported that the sample taken was safe? Or, was it his duty to have the courage of his convictions and sound a warning as to what might happen in the future? If the latter be true, he certainly could not have done so on the agar count at 37° and the lactose-litmus-bile inoculation alone.

In the light of the development of water bacteriology within the last five or six years, it is hard to find any justification of an attempt to curtail the number of distinctly different media each one of which is capable of yielding information of the greatest diagnostic value. Had the committee long ago suggested that a standard report should include both gelatine and agar counts, gas production in both dextrose and lactose, tests for hydrogen sulphide production and for nitrate reduction and several other valuable diagnostic methods, Whipple would not have been forced to point out the lack of sufficient information to properly weigh the value of one method against another. If we are to make bacteriological examinations of water, why not make them in such a manner as to yield the fullest information possible and make them from the point of view of water problems and not those of pathology. In both the chemical and microscopical examinations of water the analyst searches for evidence of insanitary conditions in the broader sense. Why cannot the bacteriological examination be placed upon a similar sound foundation? Is it not high time that we realized that the methods and aims of pathological-bacteriological investigations are not necessarily those best fitted for water examinations and that we disabuse ourselves of the delusion that unless it can be *positively proved* that a food or a beverage will cause serious illness, it must be considered safe?

REPORT OF THE COMMITTEE ON ORGANIZATION AND FUNCTIONS OF MUNICIPAL HEALTH DEPARTMENTS.*

Read before the Municipal Health Officers' Section, American Public Health Association, Washington, D.C., September, 1912.

Your committee in continuing the work of reporting upon the organization and functions of Municipal Health Departments, is guided by the letter of transmittal by the chairman of the 1911 committee, in which he stated "The report is presented to bring up the entire subject in a tangible manner for discussion and recommittal by the committee for future consideration and report on the technique and methods of operating, as well as organization."

Since the report of this year must go hand in hand with the report submitted to you at the Havana meeting, reprints of that report are distributed among you in order to permit of ready reference without undue repetition. Your attention is, therefore, first directed to the summary of the questionaire which was submitted to the cities of 25,000 population and over, and in a review of the answers we are impressed that much of the earlier health legislation was legislation of expediency. Later legislation, guided by experience with earlier laws and the developments in medical and sanitary science, shows a more rational method of dealing with health problems, and thus we find that the administrative work, *i.e.*, the practical operation of a Health Department is rapidly developing into a better recognized branch of health work.

We invite discussion on what is considered to be three fundamental principles which should control work for the protection of public health.

1. The need of the individual must give way to the rights of the many.
2. Care and control of existing communicable diseases.
3. Preventive work.

In the development of measures to carry into effect the foregoing principles, questions have arisen in the past which are pertinent at present and will continue to arise in the future, as to what activities of a municipal government may be properly assigned to the Health Department for execution. Here we may well pause, as we study the summary of the answers given to the questions asked.

While all will doubtless agree that Registration of Vital Statistics,

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*The wide separation of members of the committee has precluded any conference prior to the meeting of the Association, nor has there been time for correspondence, owing to an inadvertence in not learning the committee personnel until recently, so that the chairman of the committee has been unable to receive the benefits of counsel from his fellow-members, therefore it has seemed best to him to present the subject-matter in such form that discussion might be had at this meeting.

Medical Inspection of Contagious Diseases, Child Hygiene, Contagious Disease Hospital, Laboratories for Diagnostic Research Purposes, are proper subjects for a Health Department, yet we are sure to have differences of opinion when we come to discuss the assignment of such branches of Municipal housekeeping, as Street Cleaning, Collection and Disposal of Garbage, Water Supply and Sewage Disposal, to the Health Department, and doubtless will have differences of opinion, although perhaps to a lesser degree in the matters of Food Inspection, Housing Inspection and Inspection of Plumbing.

Is it not true, however, that these are the details of specific local problems, and that the health officer in any particular locality finds himself surrounded in his particular situation, by assignments, which are the result of the development in his environment and the outgrowth of the local traditions, in which he must work out the salvation of the work entrusted to him?

There are but few details of municipal organization in which considerations of public health do not enter. Water, milk and food supplies, drainage, street cleaning, waste disposal and housing conditions, are surely matters affecting the public health, and the proper regulation of these necessities bear directly upon the preventive phase of health problems. A Health Department should concern itself in all of these matters, and its organization should be such that a direct and compelling influence should be exercised over them in every municipality.

Since we find these details assigned in a greater or less degree to various Health Departments, is it not then better for the health officer to well acquit himself with his particular assignments than to seek to shift them to some other department of the municipal government, stating that they are not health matters?

We recommend to you the usefulness, in fact, we may say the necessity, for a uniform classification of Health Department expenditures and the detailed publication of the same in annual reports. This plan, we believe, would lead to ready comparison of costs of work in various cities, and all concerned would profit therefrom. The Department of Commerce and Labor has done considerable work toward preparing a system for classification of Health Department expenditures, but to the best of our knowledge, it has not yet been published.

Your committee has nothing to add to the plans proposed for the organization and functions of a board of health, as set forth on page 374, of the Journal of the Association for the year 1912.

We would like to call your attention to what is, in our judgment, an essential detail to successful operation of the bureaus into which a department is divided, and that is, that there should be a regular weekly meeting, at which the various bureau heads should meet with the health commissioner, for presenting and discussing such matters as concern the whole department and the relations of the bureaus, one to another. It is absolutely essential in the conduct of any organization, that there should be what is commonly known as "team work," and meetings of the character outlined are a means toward producing uniformity of action and united effort.

In the conduct of a Bureau of Medical Inspection, there are many points of detailed operation which would have to be governed by local conditions. There are, however, some points which are common to all:—

First, and most essential, is that there should be a clear cut and concise law governing the care and control of contagious diseases.

Second, the enactment of such a law does not necessarily imply the fulfillment of its provisions. It must be administered in such a manner that the coöperation of the medical profession and the citizens of a community are secured. It is essential that all cases of contagious diseases should be promptly reported, and much of the coöperative work depends upon the ability and tact of the medical inspectors, who come directly in contact with the public. The work of a Bureau of Medical Inspection is made much more efficient when an adequate contagious disease hospital is provided for the care of contagious diseases. Through the operation of such a hospital, quarantines may be made less burdensome, and adequate protection be provided for the public, with a minimum restraint of personal liberty, and at the same time reduce both morbidity and mortality. A hospital for contagious diseases is intimately related to the division for the care and control of diseases of the same kind and class, and a close relationship should be established between these two branches of the bureau's service.

The Bureau of Medical Inspection should also perform the work of medical inspection of school children and examination into sanitary conditions of school property. It is a well-recognized fact in Health Department work that the beginning and the close of the school year mark two distinct periods in the annual prevalence of contagious diseases. However, the work of this division should not be confined to contagious diseases but should comprehend examination for those physical defects whose early correction will add much to the welfare of the pupil, and produce economic gain to the community. This inspection service should be supplemented by a follow-on system for corrective measures. There is no better way known to your committee for securing this treatment than to have a corps of school nurses organized, as authentic records show that the number of recommendations acted upon increase many fold when the work of the medical inspector is supplemented by that of the school nurse.

The establishment of municipal dispensaries for correcting some of the physical defects found to widely prevail in school children, namely, those of the eyes and teeth, is a question well worthy of careful consideration, for the reason that backward, ill nourished children are an economic loss to the community. If a child can be supplied with glasses at a cost of about one dollar, which will correct eye defects and cause the child to become interested in his school work and take his normal position in the ranks of school children, where the cost of his yearly schooling is between thirty and forty dollars a year, in school rooms that are overcrowded, there can be but little doubt as to the advisability of providing properly regulated municipal eye dispensaries. Likewise, with the dental dispensaries. For those of you who have carefully read reports on school medical inspections, cannot fail to be impressed with the great number of children who are affected with dental caries, and likewise must have been impressed by the small percentage of these defects which are not corrected unless there has been intervention of nurses and dispensaries.

A progressive department of health cannot long overlook the necessity for work directed toward the conservation of child life. When it is considered that approximately one-fourth of the total mortality in municipalities is made up of the mortality in children under *five* years of age, the importance of work along these lines can scarcely be overestimated, and a Bureau of Child Hygiene is a necessary adjunct to a well-organized Health Department.

A study of the mortality statistics of any progressive community will show that the deaths from communicable diesases is on the whole steadily decreasing with increased knowledge of the cause of those diseases, and improvements in their care and treatment. In order to obtain better conditions of public health, the work of Health Departments must, therefore, be directed with greater force against those factors, namely, the food supply and the sanitary conditions,—which directly affect the vital resistance, and for this reason we hold that food and sanitary inspection service should be a function of Health Department work, The work of a Bureau of Food Inspection is generally conceded to cover the inspection of milk and meat, which have been provided for in the first report by separate divisions, with provision for an inspection of bakeries, restaurants, hotels, markets, etc., under a division of General Food Inspection. Inspection of drugs is also a field for service by Health Departments. This work is primarily a branch to be assigned to the chemical laboratory. The collection of samples can be accomplished through the medical inspectors or food inspectors, as best suits the convenience of the Bureau.

Under the Bureau of Sanitation is placed those functions of municipal housekeeping which in the opinion of quite a number of people should be assigned to a Department of Public Works. Plumbing inspection and nuisance inspections are so intimately related to Health Department work, through the passage of laws prior to the development of our knowledge concerning the germ theory of transmissible diseases, that it would be no slight task to effect a transfer. Bad odors cannot be now claimed to directly cause disease. However, the insanitary conditions which usually prevail where bad odors are found, do exert a depressing effect on vital resistance, and make the dwellers in such districts more liable to sickness.

We must not forget that insanitary conditions foster and favor the continuation of pests which are now well known to be disease carriers, and we cannot see that it would be otherwise than a mistake to take sanitary functions away from the Health Department, and would rather urge the enlargement of this phase of health work. Who should direct the war on mosquitoes, flies, rats, mice and other vermin, if not the Health Department? The organization of a system for the sanitary policing of a municipality is a difficult problem, and we suggest for careful and thoughtful consideration the arrangement of a system which would engage the police forces of our cities, not only in the work of maintaining order, repressing violence and preventing housebreaking, but which would extend their work more largely into the field of enforcing sanitary regulations than is now generally practiced in our municipalities. A Health Department can safely adopt the slogan,—less dirt, less disease—and be well within the limits of conservative statement.

The data collected by the Bureau of Vital Statistics is the health officer's barometer, and the organization of this Bureau should be so perfected that the information gathered by it will be accurate and promptly analyzed for the guidance of the department. This Bureau, when properly conducted, furnishes material which, when properly prepared, becomes the means for instruction and publicity work, whose value can scarcely be overestimated, and we would urge upon you the most hearty coöperation with all departments of your governments, which are laboring for better registration of vital statistics.

The Science of Bacteriology has become the most potent scientific means at the disposal of health officers for the care, control and prevention of communicable diseases, and a Health Department cannot be considered to be properly equipped until it is provided with an adequate laboratory. The extent of this equipment must perforce be governed by the size and financial ability of the municipality, and if such equipment is beyond the resource of the department, then an arrangement should be made whereby the facilities which are now provided by most states and countries would become available for aid to the municipal officers.

Your committee wishes to emphasize the need for and the usefulness of publicity work in conjunction with the efforts of a Health Department in its efforts for the care of public health. There is no group of people which cannot be reached at the present time by instruction properly directed. The requests that daily come to a health office for information are evidence of the widespread interest of the people at large in matters affecting their health. The press, judging from the opinions as expressed editorially in the leading journals throughout the country, is deeply interested in public health work. You cannot pick up a journal devoted to general information, which does not have its column or columns devoted to health matters. The imparting of instruction in matters of this kind is an art in itself, and the needs and temper of each municipality or community must be carefully studied and means adopted which will be applicable to the situation in hand. One of the best means for a publicity campaign is found to be in providing shows in which graphic presentation of good and bad conditions are clearly set forth. The arrangements of these shows need not necessarily be elaborate. Each exhibit should be framed to present some definite fact, in a simple and direct way, which would make a clear and lasting impression on the mind of every visitor. At the time the show is in progress, the aid of the public press should be solicited to further the work in hand.

In presenting to you the needs for publicity work, your committee invites your consideration to the statement that successful Health Department work on the municipal health officer's part, requires the taking of infinite pains to secure and to hold the confidence of the people, and to get them to engage in the practical application of the hygienic and sanitary science now known. The unknown is still alluring, and the search for the unknown and mysterious probably will be, and it should be, kept up, but to us as health officers, is allotted the task of getting the people to do the little things, and could we be successful in getting all of the people to comply fully with what is now known in preventive medicine and sanitary science, our mortality rates would be greatly decreased.

The functions of a municipal health department cannot be discussed without touching upon the relations between municipal, state and federal authorities. That relationship could well be the subject for a committee report, possibly more extensive than the ones which have been presented to you on the functions of municipal departments. We will, therefore, dismiss that topic with the recommendation that those relations should be of the most thorough coöperation, and trust at no distant day the federal government will at last awake to the needs of a Department of Public Health, and realize that the conservation of human life is not a lesser problem than those now entrusted to separate departments. Your committee realizes that there is much more to be said on the subject here reported upon, and respectfully suggests that if it meet with the approval of the section, the subject can be further pursued with profit by requesting a future committee to report upon a method for classification of municipal health department expenditures.

John A. Voglesen,
Chairman.

REPORT OF THE COMMITTEE ON THE STUDY AND PREVENTION OF COMMUNICABLE DISEASES.

Read before the Municipal Health Officers' Section, American Public Health Association, Washington, D.C., September, 1912.

It has seemed to your committee that the chief part of its report must necessarily consist of a brief review of such work as has been done during the past year in the study of the more common communicable diseases, in order that health officers and others interested may avail themselves of the information.

It is, of course, impossible in such a brief review to do more than refer to the salient points.

Of these commoner diseases typhoid fever, scarlet fever and measles have been chiefly studied.

Typhoid Fever.

The work on anti-typhoid vaccination has greatly increased the knowledge of its value and has shown that many of the limitations which apparently existed have no foundation in fact.

Thus, the so-called, negative stage has been shown to be practically non-existent, and the value of the protective vaccination is greatly increased by this knowledge, as it allows its use in the presence of an outbreak of typhoid, at a time when protective measures are especially needed. It has been shown also that the reaction following the injection is much less severe than was formerly supposed, and a possible objection to its use, on the part of the subject, is practically removed.

The observations of Russell, in military life, and of Spooner and Hatchell and Stoner, in civil life, show that the chief precaution to be observed is that the subject must be in good health, for the injection is liable to start up an old chronic affection and cause it to become acute.

In the opinion of all these observers anti-typhoid vaccination should be used more freely, and your committee suggests that Health Departments should recommend physicians to urge its use by their patients, not only when liable to exposure to typhoid, but as a simple precautionary measure.

During the past year the Massachusetts legislature passed an act authorizing the State Board of Health to produce and distribute anti-typhoid vaccine.

This is a notable step, as it enables local Health Departments to obtain a reliable article for distribution among local physicians, and by increasing the facility of obtaining the vaccine, should tend to increase its use.

It is hoped that other state legislatures may recognize the value of anti-typhoid vaccination and pass similar acts.

Data are lacking as to the length of time that the immunity conferred by anti-typhoid vaccination persists, but it is safe to assume that like vaccination against smallpox, the percentage of immunity among those treated decreases rapidly as the length of time from the protective vaccination increases.

It is well to remember that, like vaccination against smallpox, protection is not absolute, although even in those few cases where it apparently fails to protect against the disease, it modifies its course greatly.

MEASLES.

Measles still remains one of the most difficult of the commoner communicable diseases to control.

It seems to make little difference whether persons with measles are strictly isolated during the continuance of the disease and the premises fumigated after recovery or whether they are simply excluded from school, allowed to go about freely and no fumigation is done.

Education of the public seems to offer the most efficient means of controlling measles. As long as parents continue to regard measles as a harmless and necessary disease of childhood, so long will efforts to control it be unavailing. The efforts of health officers should be directed to teaching the public that measles is not a harmless disease and that the death rate is fully as high as that from scarlet fever or diphtheria, and at times even higher.

The most efficient methods of instruction appear to be by means of articles in the local papers, by lectures, by bulletins issued by the Health Board and by talks given by the school inspectors to the teachers and pupils in the schools.

The observations of Anderson and Goldberger show that measles can be reproduced in monkeys for twenty-four hours before and forty-eight hours subsequent to the appearance of the eruption, showing an apparent period of infectivity of three days. Also that it is apparently transmitted by means of the naso-pharyngeal secretions and not by the scales of desquamation. These observations show that the disease is infective at the time of the appearance of the Koplik spots, a fact which confirms the previously held opinion that a child may infect others before the appearance of the rash or during the catarrhal stage.

It follows from this that during the prevalence of measles in a community a child with catarrhal symptoms should be regarded with suspicion and, where possible, excluded from school until it can be settled whether he has measles or merely a coryza.

It is fairly well admitted by all observers that measles is not transmitted by means of fomites, using this term in the sense in which it was defined by your committee in 1911.

SCARLET FEVER.

While no definite conclusions as to the specific organism of scarlet fever have been reached, the discovery of certain inclusive bodies in the leukocytes of scarlatinal blood has led the New York Department of Health to declare that these inclusive bodies are found in scarlet fever usually during the first week, and always during the first four days; also, that they have not been found in other exanthemata, and are diagnostic of scarlet fever. On the other hand, other observers more recently have declared that these bodies have been found in other febrile conditions. Until further information is available it seems best to look upon the presence of these bodies as simply confirmatory of the other symptoms and as by no means diagnostic.

Evidence is accumulating that the infectious principle in scarlet fever resides in the naso-pharyngeal secretions, and not in the scales of desquamation.

In those hospitals in England and the United States where it is customary to discharge patients when the nose and throat appear normal regardless of desquamation, a marked reduction in the length of detention is shown without any appreciable increase in the number of return cases.

A certain number of cases seem to show a return of infectivity some time after release, this return being apparently due to a coryza.

Doctor Morton, superintendent of the Lightburn Hospital, Lanarkshire, England, speaking of return cases says: "We are more and more being forced to the opinion that scarlet fever is only infectious by means of fresh discharges, usually transferred by direct transmission from one person to another, or if not directly, then by something which has been inoculated with the discharge not more than a few hours previously."

Little has been added during the year to our knowledge of the value of anti-streptococcus vaccine in scarlet fever, either for treatment or prevention. In Chicago some few cases of septic scarlet fever have improved very rapidly under this method of treatment, but the work which was carried on at the Contagious Disease Hospital has been discontinued and no further reports are available.

The experience at the Haynes Memorial Hospital for Contagious Diseases in Boston in immunizing nurses with a polyvalent anti-streptococcus vaccine is interesting.

During the first two years after the opening of the hospital over 35 per cent. of non-immune nurses contracted scarlet fever. At the end of that period it was decided to offer immunization to non-immune nurses.

Cultures were taken from a number of scarlatinal throats in order to obtain a number of strains of streptococci. From these a polyvalent vaccine, standardized at five hundred million per cubic centimeter was made. This was offered to the non-immune nurses as a protection against infection.

During the next two years thirty-five non-immunes were on duty, of whom twenty-one were vaccinated and fourteen were not. Of the twenty-one who were immunized, one contracted the disease, while of the fourteen who refused treatment, five were taken sick.

Doctor Watters informs me that since the above experience, three non-immunes, inoculated with a polyvalent streptococcus vaccine, not made from scarlet fever patients, all contracted the disease in a mild form.

This suggests a difference in strains between the streptococci frequently found in scarlatinal throats and the ordinary pyogenic type.

In England a few cases have been treated with an autogenous vaccine, with apparent success but the number of cases in which either the autogenous or stock vaccine was used is too small to be of much value.

There is still a difference of opinion as to whether scarlet fever can be transmitted by fomites but the evidence in favor is growing less. The observations of Nesbitt on the transmission of infection by means of books, while not extensive, are exhaustive and seem to show that it is not so transmitted.

Your committee is of the opinion that the disease is transmitted by contact alone and that all apparent evidence to the contrary is based on lack of knowledge or a misapprehension of facts.

GENERAL CONSIDERATIONS.

As was the case last year, your committee has made no report in regard to the value of terminal room disinfection, as commonly done by Boards of Health, upon the control of communicable diseases, for the reason that another committee of the Association has this question under consideration.

Your committee, however, is of the opinion that terminal room disinfection, as at present practiced by the average Board of Health, has little effect in controlling the spread of infection and that it appears, in so far as figures are available, that the percentage of return cases is practically the same in those communities where disinfection is compulsory as in those where it is not required.

The committee suggests the following as the most available methods for Boards of Health to follow in cases of communicable diseases:

EARLY REPORTS OF EVERY CASE OF COMMUNICABLE DISEASE.

Health Boards must rely upon the practicing physicians for these reports but can help in getting the reports early by making sure that physicians are supplied with lists of reportable diseases and with the necessary blanks for making the reports; by punishing chronic delinquents and by acting promptly when the report is received.

It is well to urge physicians to report their suspicious cases, for it is not the typical cases which cause trouble but the atypical ones, and the health officer can decide in regard to these more surely than the busy physician.

PROMPT INVESTIGATION OF EACH CASE.

The proper officer should make a prompt investigation of each case, obtaining as complete a history as possible. This investigation may reveal a carrier or undiscovered case, whose isolation will remove an unsuspected focus of infection. It will also allow the proper officer to make his decision in regard to the disposition of the case and show the reporting physician that the authorities are active.

EARLY REMOVAL TO A HOSPITAL.

Whenever it appears to the investigating officer that proper facilities for home isolation are lacking, the patient should be promptly removed to an isolation hospital. It is necessary that the Health Department should have the final decision as to the necessity of removing the patient to a hospital and should have the power to have its decision carried out, by force if necessary.

In many states this power is given to Health Boards by statute. Your committee suggests that where it is not so given, that the State Association of Health Officers urge the passage of a statute giving the power.

EFFICIENT ISOLATION OF THE PATIENT.

If it is impossible to remove the patient to a hospital the Health Officer or inspector should oversee the isolation at the home, suggesting the rooms to be used for the patient, giving explicit directions in regard to the details of the isolation and seeing that the orders are carried out, by means of unexpected and frequent domiciliary visits.

Where possible the restrictions upon the well members of the family should be as few as are consistent with proper protection of the public.

It should be understood that any violation of the rules will be followed by a rigid quarantine of the whole family.

IN CONCLUSION.

The whole method of dealing with the care of cases of communicable disease should be arranged in such a way that there is as little interference with the well members of the family as is consistent with proper protection. The less burdensome the process is made the more prompt physicians will be to report their cases and the fewer concealed cases will there be.

FRANCIS GEO. CURTIS, *Chairman*,
CHARLES V. CHAPIN,
JULIO F. ARTEAGA,
S. D. RAWLINGS,
CARLOS M. GARCIA.

DISCUSSION.

Dr. E. C. Levy (Richmond): In connection with the report of Dr. Curtis, there was one thing, mentioned incidentally, that I think ought to be discussed, or noticed, at any rate. Dr. Anderson's work in connection with measles has shown it is infectious for a very few days in monkeys and many of us would be tempted to shorten the time of quarantine in measles very materially. But I think it would be undesirable to make the time of quarantine less than twelve days after the appearance of the eruption, because secondary cases are liable to develop. Measles is the most contagious disease we have, and, unless time is given for these secondary cases, we are going to have trouble, and it takes twelve days at least to determine that. I think it would be very inadvisable to shorten the time of quarantine to less than twelve days for that reason.

Dr. Rawlings (Chicago): I heartily agree with the remarks of Dr. Levy in regard to the primary cases. When we get that second crop, however, I think we should promptly throw down the quarantine after the development of the second cases. We know that measles is very highly infectious and that of 95 per cent. all those exposed will contract the disease promptly and that therefore the chances are very big that everyone exposed will, after the usual fourteen days, develop the cases. It works a great hardship if we tie up the secondary cases for two weeks. In Chicago we, as a rule, keep our quarantine on the primary cases for this length of time. If, however, we go in a home where there is only one child, and our inspector reports that there are no other susceptibles, we promptly throw down the quarantine, if the physician is willing in a much shorter period than fourteen days, and after the secondary crop has developed in that home, we also throw down the quarantine very promptly.

Dr. Crighton (Seattle): In reference to measles, a very interesting thing is this: take a census among those fifty years of age and see how many have not had measles, and then, under our modern methods of quarantine and handling contagion, take a census of those 15, 18 or 20 years of age, and see how many have not had measles. We have not been able, in Seattle, to control measles to any appreciable degree by quarantine. We have had more men in this department than any other, according to the amount of work we have had, so that I believe we have done the work fairly satisfactorily. We have had a number of men employed in this department to make the quarantine as easy as possible and as satisfactory to the people and have fairly covered the ground.

There is another question I wish to touch upon. I don't know whether it is original work or not, as we are so far from the rest of you people that we don't know just exactly where we are at all the time. In the City of Seattle, the entire water system is under the Health Commission, as is the collection of garbage, school work, etc. In a watershed which embraces about 82,000 acres of land we are now building a dam on which we have about six hundred men. This is an uninhabited watershed. We have put several little communities out of it, one of as many as five hundred people, until we now have an almost uninhabited watershed, but in the building of this dam, we have established a small hospital well equipped, with two or three up-to-date bright young men in charge—physicians. Six hundred men are employed in building the dam and every man who goes into the watershed to build the dam has to be examined physically by the Department on blanks properly prepared, showing his condition of health, but particularly in regard to typhoid fever. A blood sample is taken and if the reaction is positive, he is not allowed to go into the watershed at all. If we do have a positive reaction, then the fecal matter and urine are examined to determine if the case is a carrier. In every case, in any instance, every man going in received the typhoid vaccine. I just throw that out as possibly a means of protecting a watershed during municipal or state activities within the watershed, which may be of some practical help. It may be an old thing in the East.

REPORT OF THE COMMITTEE ON MEDICAL INSPECTION OF SCHOOLS AND SCHOOL CHILDREN.

Read before the Municipal Health Officers' Section, American Public Health Association, Washington, D. C., September, 1912,

Your Committee on Medical Inspection of Schools and School Children begs leave to make the following report:

Medical inspection of school children was first introduced into this country in Boston in 1894 by Dr. S. H. Durgin, who is the chairman of this committee, but who is detained in Europe and has asked that we make a report on the subject during his absence. Since the introduction of a systematic medical inspection of school children in Boston, the work has been undertaken in many other cities; in fact, it is difficult to find a city of any considerable size in this country at the present time in which medical inspection of school children does not exist in one form or another. It is a fact that in some places the system is still in its incipiency and may be limited to one physician or possibly to one or two nurses without even a physician in charge. Medical inspection of schools is sufficiently well established to warrant its endorsement by this section, and it has seemed further that in endorsing this work that we should make certain recommendations looking towards uniformity in the work throughout the country. To arrive at some conclusions as to the viewpoint taken by sanitarians through the United States, I have written letters and submitted a number of questions to the health commissioners of twenty-six cities and have received answers from twenty-three of them, including Detroit. An analysis of the answers shows that some form of medical school inspection is quite universal, as it is in vogue in every city from which the answers were received.

The question of the proper control of this work has long been an undecided one, and we find that of the twenty-three cities in question, there are eleven in which the control is entirely in the hands of the board of health, six in which it is divided between the board of health and board of education, and six in which it is entirely under the control of the board of education. It would seem from these figures as though the majority of the sanitarians believe that the control of medical inspection of schools should be in the hands of the board of health. It has also seemed to your committee as though the question should not be a debatable one but should be settled in accordance with the majority vote as submitted above. The first difficulty that presents itself when boards of education undertake the supervision of medical inspection of school children is that they have in many cities and states no legal right to exclude those who may be suffering from contagious diseases and find themselves compelled to refer such cases to the Department of Public Health. The same difficulty arises in every instance in which it is necessary to exercise police power, which is possessed by the board of health and not by the board of education.

Again, in our endeavor to correct physical defects in school children, which is an important feature in medical school inspection, we are confronted with a *medical* and not an educational problem. It is necessary to take many of these children to dispensaries and free clinics of various kind, where they will receive proper medical attention, and this can be done much more easily, and much more efficiently, by the Department of Public Health, which is constantly in touch with the physicians of its community, than by the board of education. Dr. W. J. Gallivan, Chief of the Division of Child Hygiene of the Health Department of Boston, in a letter addressed to the acting chairman of your committee, and dated September 9, 1912, says: "Let me say that the school physicians, eighty-two in number, are under the authority of the Health Department; the school nurses, thirty-five in number, are under the authority of the school committee. This is a divided responsibility. I hope in your report you will cover this phase of the question, and recommend that nurses and physicians be placed under the Health Department. It strikes me that school inspection is a medical rather than an educational problem and properly belongs to the Health Department. The energies of school committees can then be directed in providing non-medical treatment for such defective pupils who are not able through infirmity to keep up with the average pupil. Notable opportunities for such activity are afforded in cases of mental deficiency, defective hearing and defective speech, which require special instruction; cases of pulmonary and joint tuberculosis, which require open-air class-rooms; cases of orthopedic disease, which require gymnasium exercise rather than class-room work; and finally cases of trachoma which ought to receive instruction apart from their more fortunate brethren."

Referring again to our list of questions submitted to the various health officers, we find that in twenty-one cities the medical inspectors examine the children for the purpose of detecting any possible cases of contagious diseases, and also for the purpose of locating any physical defects whereas in only two are these examinations limited to the detection of contagious diseases; strange as it may seem, in both of these instances, the work is under the control of the board of education, and they are doing the very part of the work over which they legally have absolutely no control.

In the cities in which physical defects are looked for, special attention is paid to the inspection of the mouths of the pupils for defective teeth, but this is done in a number of instances by the physicians, and in other cases by dentists specially employed for that purpose. In sixteen cities this special work is done by the doctors and in only eight, dentists are employed for this purpose. Again we find that the number of physicians employed in various cities differs so greatly in proportion to the number of pupils that each physician is required to look after from 1,000 to 5,000 pupils daily, depending upon the city in which he is employed. Such is the rule; but in exceptional cases, we find that much more of this work is put upon the individual examiner. One city with 38,000 school pupils has the work done by a single physician, and in another with 47,000 pupils the work is done by three physicians, and still another with 80,000 pupils has five physicians. Of course, these exceptional cases should remain exceptions, as it is the opinion of your committee, which would be coincided in by any giving the subject much thought, that even 5,000 pupils are too many to come under the supervision of a single examiner. The maximum number should be 3,000. It will be absolutely necessary to make this limitation when more cities and states have a law making physical examination of school children compulsory. Such a law exists in Boston now, and we quote again from a report made to your committee by Dr. W. J. Gallivan of that city:

"Statute law requires that a physical examination of every pupil in the public schools shall be made once a year. Pursuant to this law, for the first time, a physical examination was made during the year 1911–1912. The authorities in charge of the parochial schools were eager to have the children in their schools receive the same benefits as the children in the public schools. Consequently a physical examination was made in these schools." A table appended to the report shows that 118,781 pupils were examined and that 40,850 were found without defects and 77,931 with defects.

Not many health officers are engaged in this work of medical examination of school children for any length of time, before they realize that the results to be obtained are very unsatisfactory without the aid of the school nurse, and we find that of the cities referred to, sixteen employ nurses to aid the doctors in their work, and only seven attempt the medical inspection of schools without the aid of the school nurse. It is a noticeable fact on the other hand, that in many instances the number of doctors far exceeds the number of nurses; in only four cities are there more nurses employed than doctors, and in twelve the condition is reversed. Dr. C. Hampson Jones, Assistant Health Commissioner of Baltimore, in answering our questions and commenting upon the work done in Baltimore says: "In addition to the above answers, permit me to say that in our judgment our work is not developed to the extent that we believe it would be of the most value; for example, we have tried for some time to obtain an increase in the number of nurses rather than in the number of physicians, although both would be acceptable. We consider one physician can keep at least three nurses legitimately busy in obtaining results. It is the follow-up work after all that does the most good." Doctor Jones is right in his statement. We believe that there should be at least as many nurses as there are doctors, and perhaps it would be a good thing to have even a larger number. In a paper read before this section several years ago by the acting chairman of your committee, he said among other things that the work of the medical inspection of schools was only half done without the aid of the school nurse. Dr. S. H. Durgin, in discussing the paper referred to, said that he agreed with the author in most of the points made but added that in his opinion, the work of the medical inspection of school children was not done at all without the aid of the school nurse.

The next thing of importance in considering this question is where to send the children who need medical attention for the correction of physical defects and whose parents are unable to pay. The answers to this question as given by the health officers is that the children are either sent or taken to various hospitals, hospital dispensaries or free clinics, and in two instances they are sent to such private physicians as may volunteer their services. It has been the experience of at least one member of your committee, that as a general thing the attention received at the free dispensaries of private hospitals is not very satisfactory. If there is anything more required than a mere "dispensing" of medicine, the same is not usually available. The volunteer physicians begrudge the time to make careful examinations of defective eyesight or defective hearing nor have they the time nor inclination to do operations on the nose and throat which are so frequently required in these cases. We believe that clinics should be established by boards of health for the purpose of taking care of cases among the children of the poor that need attention. In order to ascertain what was being done in this respect, the question was asked whether there are any clinics for the purpose of taking care of the needy school children under the control of the board of health or board of education. It was found that there are no such clinics controlled or maintained anywhere by boards of education, but in five cities there are board of health clinics, one of these is in connection with a city hospital under the control of the Department of Health; the others, as we understand the answers, are separate clinics maintained for the purpose of looking after school children but they are limited to the correction of dental defects and defects of eyes and ears. The maintainance of such clinics is a step in the right direction but we believe that this work should be extended so that all cases of physical defects of school children, whose parents are unable to pay for medical advice may be referred to the clinics of the same department which has charge of the work, namely: the Department of Health. In this way the best results will be obtained.

There should be more uniformity than seems to exist in the matter of time that it is necessary for the doctor to devote to this work and the salary he is paid. We find in all cities in which nurses are employed they devote their whole time to the medical inspection work and are paid salaries ranging from $600 to $900 per school year. In the case of the doctors, the situation is very different. There are only three cities on our list in which the doctors devote their whole time to medical school inspection, and in the others, the time required of the doctor varies from one hour to five hours per day. The salaries for physicians working on whole time range from $1,400 to $2,000 per year, whereas those devoting only part of their time, are paid from $300 to $1500, depending upon the city. With an adequate corps of nurses as an aid to the doctors, it does not seem necessary that the latter should devote their whole time to this work because the system of following up the cases is the most necessary, and this must, of course, be done by the nurses. We should not urge that physicians be underpaid, and yet it does not seem to your committee that it is necessary to pay as high as $1500 for part of the time of a young physician engaged in medical school inspection. The work is interesting and beneficial to the doctor and he should be willing to serve for less money. A salary of from $600 to $900 a year ought to be sufficient.

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In summing up, your committee desires to make the following recommendations:

First, that a system of medical inspection of schools be established in every city.

Second, that the control of the same be under the Board of Health.

Third, that the work include the exclusion of cases of contagious diseases and the recommendation of the correction of physical defects.

Fourth, that dental inspection be part of the system and that the inspection be made by dentists in the employ of the Board of Health, and that a free dental clinic or clinics under the control of the Board of Health be established for the care of children unable to pay.

Fifth, that all physical examinations except those for defective teeth be made by physicians and not by teachers nor nurses, and that dental examinations be made by dentists.

Sixth, that the maximum number of pupils under the supervision of one doctor and one nurse be 3,000, and that the number be reduced as much as possible. It would be better to have one nurse for each 1500 pupils.

Seventh, that clinics be established under the control of Boards of Health for the purpose of correcting the physical defects found in school children.

Eighth, that nurses be required to devote their whole time to this work and be paid a salary of not less than $900 a year and that doctors be required to devote only part of their time but not less than two hours per day to the work and be paid a salary ranging from $600 to $900 per year.

Respectfully submitted,

GUY F. KIEFER,
Acting Chairman.

DISCUSSION.

DR. EDWARDS (Gloversville, New York): When I first started out to do this medical inspecting of schools, the Board of Health felt that they could not secure a school nurse and I was asked by the Board of Health to do the work as health officer and medical inspector of schools. I started out with the idea of instructing the children as to what they should do and what they should not do. We have a population of about 21,000 and the Board of Education later on employed a school nurse, which is very essential for the prevention of contagious and infectious diseases. She is the one that can go in the home and advise the people what to do much better than a physician and teach them the law of hygiene in the home and they listen very much to the words of the school nurse. Relative to the treatment of these diseases, we have a dispensary and all poor children are sent there or to their physician, and we also have clinics at this dispensary where they can be treated and specialists for the diseases of the throat or for the removal of adenoids and enlarged tonsils.

DR. LANDIS (Cincinnati): Cincinnati has a school inspection service on full time, and it is principally for that reason that I rise to make a few remarks. I thoroughly agree with practically everything that Dr. Kiefer has given us in his report. I think this work belongs with the health department. If it is done by the schools, there is a division of responsibility. ! I think that the school inspectors should be on full time and give all their work to the city. If they are not on full time, their interests clash with the interests of the general practitioner and we have found year after year that we have aroused misunderstandings between our school inspector and the general practitioner. Our school inspectors are paid a salary of $1,500 a year and in addition to the school inspection, they look after the out-door poor and exercise a surveillance over infectious diseases. The system has only been in operation since the first of July and at this time it is simply impossible to give you any idea as to what the result will be.

$1500

DR. KIEFER (Detroit, Mich.): Just a word in answer to the remarks of Dr. Landis. It does not seem to me that it is possible to get the services of a physician for any length of time for $1,500 a year, and I think the result is that in some cases in which doctors are supposed to devote all of their time to the work, they are supposed to do so but do not. The physicians in Detroit are supposed to devote all of their time to the city for $1,000 a year but they don't. If you pay these men a larger salary—or a smaller one—and do not require all of their time, you can keep those same men and your work will be more efficiently done, because they will stay if they do not need to give all of their time, and as far as clashing with the rest of the profession is concerned, I think that depends on the personnel of your school inspecting corps. If they clash, they have no business to be school inspectors or in public health work, because they don't know how to handle it. This is simply a report and is merely suggestive, but in my advocacy of not having full time inspectors, it will be seen that I say, provided they have an adequate corps of school nurses who will follow up the work, otherwise they will have to do some work that could be done by the nurses.

PUBLIC HEALTH NOTES.

An Important Conference.

An English-speaking Conference on the Prevention of Infant Mortality will be held in Caxton Hall, Westminster, London, on Monday morning, Monday afternoon and Tuesday morning, August 4 and 5. The meetings will be held under the auspices of the (British) National Association for the Prevention of Infant Mortality and the Welfare of Infancy under the Patronage of the King and Queen, and will convene immediately preceding the opening of the International Medical Congress.

A tentative program has been issued by the Committee which indicates that the papers will consist largely of medical opinion. The subjects treated will be: The responsibility of central and local authorities in infant and child hygiene; the administrative control of the milk supply; the necessity for special education in infant hygiene; medical problems in infant nutrition; ante-natal hygiene.

The president of the conference will be the Hon. John Burns, M. P., president for the Local Government Board. The chairman of the English Executive Committee is Sir Thomas Barlow and the secretary, Miss J. Halford, 4 Tavistock Square, London, W. C.

The American committee, in charge of the part to be taken by the United States and Canada, will furnish information to those desiring to attend the conference.

Dr. Henry L. Coit, Chairman, 277 Mt. Prospect Avenue, Newark, N. J.

Dr. Philip Van Ingen, Secretary, 125 East 71st Street, New York City.

Athletics and Health.

In his annual report to the Secretary of the Navy, the Surgeon-General of the navy has collected the statistics of the subsequent health of 580 non-athletic midshipmen who were in the naval academy during the twenty years from 1892 to 1911, inclusive. These statistics were gathered for the purpose of comparison with a corresponding set secured last year with regard to the subsequent health of 622 men who had represented the naval academy in the crew, on the football team and in other forms of strenuous athletic contest of the same period.

Any comparison between the two groups in this matter should of course result in favor of the athletics, for they are not only picked men, but as the Surgeon-General says, twice selected, picked men. They are the men who, it would reasonably be supposed, would be best able to resist the real effects of overtraining and overstraining and who should, other conditions being equal, possess a comparatively greater degree of health and longevity. But this has not proved to be the case. It has been found that from those diseases to which athletics have a possible or probable relation there has been but one death among non-athletics as compared with six of the athletic group. Of the men still in the service whose records show abnormal physical conditions, 187 are non-athletes as against 198 athletes.

Russian Empire Morbidity for 1909.

A recent number of *Public Health Reports* contained some very interesting morbidity statistics for the Russian Empire for 1909. The tables reported are here reproduced:

Variola	143,470
Scarlatina	416,767
Diphtheria	461,722
Measles	382,612
Whooping Cough	533,791
Influenza	3,042,207
Typhus Fever	180,724
Typhoid Fever	501,000
Dysentery	373,406
Cholera Nostras	8,702
Cholera Asiatic	24,008
Epidemic gastro-enteritis	344,006
Parotitis	248,881

Erysipelas	208,220
Septicemia and Pyemia	21,115
Acute articular rheumatism	705,429
Scurvy	41,869
Croupous pneumonia	433,154
Tuberculosis	659,583
Syphilis	1,199,148
Gonorrhea	413,126
Soft chancre	138,026
Malaria	3,555,315
Scabies	4,297,226
Trachoma	844,906
Miscellaneous	
Traumatic Affections	5,396,585
Mental Diseases	112,290
Vaccinations	6,439,696

While of course, these statistics are doubtless incomplete, yet nevertheless they are of very great interest. We are accustomed to tables of mortality statistics for countries, but it is a rare thing to get morbidity figures.

15,000 Feeble Minded in New York Schools.

Fifteen thousand boys and girls, or 2 per cent. of all the school children in New York City, are feeble minded, according to Dr. Henry H. Goddard, Director of the Department of Psychological Research of the New Jersey Training School for Feeble-Minded Boys and Girls at Vineland, one of the eleven educational experts employed under Prof. Paul H. Hanus of Harvard to investigate the public school system of the city.

He says the city has no adequate facilities for handling this tremendous number of feeble-minded children; that its institution on Randall's Island is looked upon by parents generally with distrust; that the feeble-minded and normal children are as a result often herded together in the same classes in the public schools; and that the feeble minded are drilled in the abstract and to them utterly incomprehensible three R's, when they should be taught only manual and vocational subjects in home schools specially provided for the feeble minded.

Of the 15,000 feeble-minded children in the public schools of the city, the report states, only 2,000 are in the ungraded classes at present provided. The presence of such children in the normal classes, Dr. Goddard says, handicaps both the feeble-minded and normal pupils and the teachers of those classes as well. There is no adequate method at present, he reports, for discovering the feeble minded and segregating and caring for them.

Tuberculosis in the Legislatures.

With over forty legislatures in session at the present time, it is not surprising that a number of them should be considering legislation dealing with tuberculosis. Only the more important bills are considered in the following paragraphs.

In the New York legislature a vicious attack is being made upon the campaign for local hospitals by a bill prohibiting the establishment of tuberculosis hospitals "within the corporate limits of any city or village." The result of the passage of a law such as this bill proposes would be to make it doubly hard to locate or secure a site for county or city hospitals, a process which is extremely difficult at the present time.

A bill before the Pennsylvania legislature provides for the establishment of county tuberculosis hospitals to be operated independently by the State Department of Health. The bill is encountering vigorous opposition from the state health authorities which contention is that the only proper way to secure adequate hospital control of tuberculosis is by the establishment of large state hospitals and sanatoria such as the one at Mont Alto with its 800 beds.

Colorado is again considering a tuberculosis registration law. At the last session of the legislature this bill passed both houses, but was vetoed by Governor Shafroth, largely, it is claimed, because of opposition of the League for Medical Freedom, and certain real estate and hotel interests. The same interests seem to be opposing the bill now before the legislature.

A bill before the Minnesota legislature provides for the establishment of county tuberculosis hospitals with state aid. In 1909 Minnesota passed a county hospital law without a state subvention. Two hospitals have been established under this law, but in the majority of states there are not sufficient sums available for erection and maintenance of such an institution. The present bill provides that the state shall pay one half the cost of site, erection and equipment of a county or district hospital, and in addition $5 a week for maintenance.

As the result of facts gathered by the recent investigation of a state Tuberculosis Commission, the California State Board of Health has introduced legislation providing for county or district hospitals for advanced cases of tuberculosis and for other forms of local care of such patients; and also for adequate registration of living cases.

In Texas a bill of particular interest to public health workers provides for the establishment of county hospitals for all classes of sick with special provision for tuberculosis cases.

The Massachusetts legislature is considering a bill which will place the entire control of tuberculosis in the hands of the State Board of Health. The bill provides that the present Trustees for Hospitals for Consumption shall be continued under the direction of the State Board of Health and that other state tuberculosis work be centralized as much as possible under that body.

Washington anti-tuberculosis workers are urging a county hospital law before the legislature of that state. Nebraska and Iowa are asking for money to enlarge their state sanatoria, and Kansas is asking for money to build. The Tennessee Anti-Tuberculosis Association is endeavoring to secure a division for tuberculosis in the State Board of Health.

Dr. Fulton's New Work

Dr. John S. Fulton has been elected Secretary of the Maryland State Board of Health, and has already begun his new work. Dr. Fulton was Secretary-General of the International Congress on Tuberculosis held in Washington in 1908, and held the same relation to the more recent International Congress on Hygiene and Demography held in Washington last September. Before taking up work with the International Congress on Tuberculosis, Dr. Fulton had been Secretary of the Maryland State Board of Health, and in this position had been influential in inaugurating the first tuberculosis exhibition in America in 1904. He was also very prominent in originating and promoting the movement for the famous Maryland "Tuberculosis Law," which has become the model for registration laws in all parts of the United States. The Maryland State Sanatorium owes much to his efforts.

Tuberculosis and the Schools.

The December *Bulletin of the Massachusetts State Board of Health* contains an article by the late Dr. Arthur Tracy Cabot in which it is pointed out the necessity for the recognition of tuberculosis types among school children. He says:

"In approaching this problem the school authorities find themselves confronted by two classes of children. First, children who are anaemic, rundown and undernourished; in whom no signs of tuberculosis can be detected, but whose condition suggests latent tuberculosis. The disease appears so frequently in children of this class that they are frequently spoken of as in the pre-tubercular stage of the disease. Second, those who are actively tuberculous and in whom the disease can be positively diagnosticated.

"Children in the first classes of these are not dangerous to other children. They can associate intimately with the well children, but they are liable at any time to become actively tuberculous, and therefore dangerous. Life in the open air has proved its usefulness in restoring to health both adults and children who are debilitated, and in many places this class of children has been provided with out-of-door schools and with open-air rooms. . . . .

"It is quite clear that the children with open communicable tuberculosis should be separated from the healthy children for two reasons. First, because the community is responsible for the reasonable protection of the children whom it forces to attend school. With our present knowledge of tuberculosis it is almost a criminal disregard of this responsibility to allow tuberculous cases to herd with well children in our schoolrooms.

"Secondly, these children should be segregated on their own account. They need an even more rigidly conducted open-air treatment than do the debilitated children. They need extra feeding. They need a careful regulation of their work and rest-hours under the guidance of a physician, and the constant care of trained nurses experienced in tuberculosis. They must be carefully taught the precautions needed to prevent their giving the disease to others. In short, they need hospital care and treatment, and their teaching and study must be regarded as of secondary importance."

White Lead-Poisoning.

"Occupation is undoubtedly the most important factor in the etiology of lead-poisoning; and among the occupations the most dangerous are those in which lead is freely handled. This applies particularly to working in white lead and lead colors. The grinding of white lead with oil was formerly a large source of lead-poisoning, because the pigment was dry, and consequently the grinding-mill attendants and the lead-work laborers inhaled lead carbonate dust; but since in many factories the paint is now made with the lead carbonate in the moist state, by the gradual displacement of the moisture with oil during the process of grinding, this source of danger has decreased. There is said to be more danger in the process of grinding basic lead sulphate into paint-oil than there is when grinding the moist lead carbonate in oil. The dangers incidental to the manufacture of red lead are extremely serious. A recent writer in one of the trade journals reports that a large decrease in plumbism in the manufacture of white lead has followed the abolition of female labor and youthful labor in England. The decrease is also consequent on ventilation, the use of respirators, overalls, enforced cleanliness and the avoidance of lead dust. No material increase in the cost of manufacture has resulted, but death and suffering have been averted. It is always gratifying to learn of progress in combating occupational diseases, especially when, as in the lead industries, it has been so difficult to induce those employed to coöperate to their own sanitary advantage."

"Current Comment" in *Journal of the American Medical Association*, February 22, 1913.

The Value of Vital Statistics.

"Vital statistics to increase longevity must be available as a remedy for the treatment of sick bodies politic—sick towns, sick cities, sick counties and sick states. *Applied* vital statistics, with all the emphasis on the qualifying term, is the most essential and powerful remedy for the improvement of the health of social organisms, for bringing about sanitary reform, for preventing disease, for postponing death and for adding years to the duration of the average life we possess."

Thus Dr. W. S. Rankin, Secretary of the North Carolina State Board of Health, states his views on this important subject. He concludes in a pamphlet on "The Influence of Vital Statistics on Longevity," that the chief results of an efficient public health service should be:

1. The prevention of disease.
2. The prevention of deaths.
3. The retention of an average death rate or the reduction of a high death rate.
4. The elimination of the unfit from health service.

A Health Survey in Atlanta.

The New York Bureau of Municipal Research recently conducted a health survey in the city of Atlanta, Ga., and the findings of the investigation are to be found in a booklet published by that organization in December, 1912. In conclusion the investigator offers a list of recommendations, certain ones of which are given below:

"1. That the making of health ordinances or the sanitary code be the function of the board of health and that no other body have the power to repeal the same as long as they conform to existing laws.

"2. That the administrative functions under the board of health be placed under the direction of one head who shall be held responsible for their performance.

"3. That heads of divisions within the department, as the offices of health inspection, sanitary inspection, plumbing inspection, the city physicians, etc., be responsible to the departmental head.

"4. That all inspectors be required to render daily reports of work done and time consumed. . . .

"8. That the department establish reasonable control of the practice of midwifery and urge upon the city to provide training schools for midwives. . . .

"10. That a tuberculosis register be established, containing such information of the patient's history, family, and housing conditions as will help the department to take intelligent measures in checking the communication of the disease to others.

"11. That the department recognize the value of citizen coöperation in complaints made of unsanitary conditions; that permanent records be made of each complaint, its inspection and final disposition. . . .

"14. That the department formulate a plan and submit to the general council a request for an appropriation for the inspection of housing conditions. . . .

"16. That the board of health secure from the general council action which will define clearly under whose authority the sanitary policing of the watershed shall be undertaken, and that proper supervision of the watershed be at once established. The principles which actuate the general council to invest city money in a water purification plant and allow surface privies to exist in the closest proximity to the purification plant are more than incomprehensible."

Rural Health in New York State.

At the Twelfth Annual Conference of the New York State Health Officers Association, Mr. F. L. Hoffman presented the results of an inquiry into "The Rural Death Rate of the State of New York." He pointed out that although the rural rate was still below the urban, yet the urban had shown a much greater percentage decrease in the last few years. He concluded with the following recommendations:

"(1) a complete sanitary survey under the direction of the State Department of Health; (2) a study of the geographical distribution of disease throughout the rural portion of the State; (3) a study of the mortality of farmers, farmers' wives, agricultural laborers, and others employed in agricultural industries; (4) a study of occupational accidents in agriculture; (5) a study of the relation of canals and railways to the health of the rural population; (6) the question of rural isolation hospitals and dispensaries; (7) a study of the geographical distribution of cancer; and (8) the establishment of a division of rural hygiene in the State Department of Health for the purpose of providing a more effective sanitary supervision of rural districts and making the necessary scientific investigations preliminary to a substantial reduction in the rural death rate from preventable or postponable causes."

German Insurance Against Sickness.

"According to statistics recently published in the *Imperial Gazette*, the following are the principal results of insurance against sickness in Germany for the years 1910 and 1911:

	1910	1911
Number of offices	23,188	23,109
Average number insured during the year	13,069,375	13,619,048
Number of cases of sickness resulting in inability to work	5,197,080	5,772,388
Number of days for which indemnity was paid or aid rendered in hospitals	104,708,104	115,128,905
Amount of indemnities paid for sickness	$76,164,967	$85,177,478
Capital	$70,551,957	$74,496,997

Receipts and Expenditures.

"The total regular receipts in 1911 for sick insurance (not including invalidity insurance), for dues, admission fees, interest, etc., were $98,125,165, of which $92,449,305 was for dues and admission fees.

"The total regular expenses in 1911 (not including invalidity insurance) for sick indemnities, admission fees and dues returned, costs of administration, etc., were $93,420,899, of which $85,077,478 was expended for sick indemnities, divided as follows: Physicians' fees, $19,933,505; medicines and medical supplies, $12,654,754; cash indemnities,

$36,552,748; aid to women in pregnancy and childbirth, $1,618,199; burial expenses, $2,029,064; nourishment at hospitals and sanatoria, $12,223,171; aid during convalescence, $66,036. The average cost per member was $6.25. The administrative costs, not including those for invalidity insurance, in 1911 were $5,281,065."

Daily Consular and Trade Reports, February 11, 1913.

Italy's Successful Fight Against Malaria.

"Reports from American consular officers in Genoa and Leghorn, prepared in response to inquiries from the United States as to the market in Italy for a remedy for malaria, show that the prevalence of malaria in the Kingdom has steadily declined in recent years, mainly due, it is stated, to the energetic measures of the Italian Government. Quinine prepared at the State Military Pharmacy at Turin is said by Consul-General James A. Smith to be on sale at all Government tobacco shops at four cents a gram and is distributed gratis to poor patients. Consul Frank Deedmeyer writes that in 1911 the number of deaths in Italy caused by malaria was estimated at 3,500 in a total population of over 33,000,000, and he forwards a list of prominent pharmacies in the Leghorn district, which may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C."

Daily Consular and Trade Reports, February 11, 1913.

The "Iowa Plan" for Babies.

The Iowa plan for holding baby shows and scoring infants on a standard score card has now attracted the attention of the General Federation of Women's Clubs, and promises to spread throughout the country.

These contests are held in Iowa at the annual state fairs.

A primary classification into rural, town or city babies is made, after which these classes are further sub-divided with respect to age. Prizes are awarded in each division and a general sweepstake is held.

On the score card weight is given to size and general proportions, especially of the head, and to psychological features, such as disposition, facial expression, energy and attention.

Suggestions to mothers, regarding the care of infants, are printed on the back of the cards. It would appear that this scheme offers valuable opportunities for arousing interest in infant hygiene and for spreading its lessons among the people.

Spread of Tuberculosis within Families.

The much vexed question of how widely tuberculosis is spread within family limits by the carelessness or ignorance of an affected person is the subject of a painstaking consideration in a report recently issued by the Anti-Tuberculosis Committee of the Associated Charities of Minneapolis. The report is entitled "The Spread of Infection in Tuberculous Families," and was prepared especially as a brief to the Minnesota legislature in an argument for County Care of Advanced Consumptives. Doctor H. G. Lampson for two years conducted an investigation into this problem under the direction of a sub-committee of which Doctor George Douglas Head is chairman. The conclusions of the study are based upon a detailed study of forty families and 234 individuals, of which number 207 were given a physical examination. In each of these families one or more members were or had been positively tuberculous. Doctor Lampson's method of diagnosing tuberculosis by means of the von Pirquet or "skin" test may be open to valid objections on the part of many physicians who claim that this is not an infallible index of the presence of tuberculous disease.

Out of the 207 members of the forty families who were examined and studied, 138 or 66.7 per cent. showed evidences of infection by tuberculosis. Contrasted with this group, Doctor Lampson selected a "central" group of fifteen healthy families where no tuberculosis was manifestly present and found that among the eighty individuals examined, only 2.5 per cent. showed evidences of tuberculous infection. Of the forty tuberculous families there were ten families containing fifty-four members all of whom were examined and all of whom showed evidences of infection. Doctor Lampson concludes from the mass of evidence collected: "In no case where there has been proven definite exposure of a family to an open case of tuberculosis, no matter what precautions have been taken, have I failed to find a spread of infection." Contrasting eleven families in one group who had not had any supervision by visiting nurses or others (or at most supervision for only a month) with nineteen families which had been supervised for an average of twelve months, he found that in the former unsupervised group 78.2 of those examined showed signs of tuberculous infection, while in the latter 74 per cent. appeared to be infected. In other words, the difference in the amount of infection between the supervised and unsupervised groups (4.2 per cent.) appeared to Doctor Lampson to be so small as to be negligible.

"It would appear from my study of these families that the only effective means of preventing the spread of tuberculosis in families is to take the open cases out of the homes and segregate them," Doctor Lampson says. "Instruction by nurses has been practised in this city for over seven years, and during the last three years difference in the percentage of tuberculous infection in the supervised and instructed families, as compared to those which have not had this care, is apparently very slight."

Doctor Lederle's Spring Campaign.

In reference to the New York Health Department's plans for "cleaning up" the city during the present spring, Doctor Lederle is quoted as follows in the *New York Times*, March 10:

"The importance of an annual campaign like this, as a sanitary measure, has been largely underestimated. It is true that hundreds of tons of refuse matter are removed from the city every day under the present system. It must not be lost sight of, however, that there is a certain percentage which always remains more or less permanent. This percentage gradually collects and after a certain period represents an enormous quantity distributed throughout the entire city, in houses, cellars, stables, stores and so forth. These collections remain indefinitely, according to the will of the owner of the premises. While such accumulations do not produce disease, they do undoubtedly produce conditions which are favorable for the production of disease.

"In view of these facts, the problem which faces us today comes directly under the jurisdiction of the Department of Health. Further than the obligations of the city organizations, there remains the obligations of the individual or the citizens themselves, which are none the less binding, and it is the duty of every individual citizen living within a community to not only live so as to be decent, cleanly and sanitary within his own house in order to preserve his own good health, but, to respect the rights of his neighbors sufficiently, not to allow the collection of refuse and filth in his home or in his place of business.

"The dirty housewife is the cause of a heavy percentage of infant mortality, which is, perhaps, one of the most important considerations in such a campaign. For that reason it is peculiarly fitting that the Babies' Welfare Association should take an active part in the work.

"Our campaign has a triple motive. Not only do we wish to remove all waste material which may be detrimental to the general health, but we want to eliminate as much as possible all breeding places for flies and other insects, the real transmitters of diseases.

"The Board of Aldermen will be asked to appropriate an extra fund for carrying on this work. For the purpose of estimating the probable cost the Department of Street Cleaning has assigned sixteen inspectors and a foreman to the Department of Health, who have been detailed to make close inspection of typical districts.

"'Incidentally, this small inspection squad is discovering some very striking conditions in different parts of the city,' remarked the Commissioner. 'I expect to have a report based on its findings in a day or two that will contain some startling information for our citizens who do not visit the tenement sections very often.'"

A Training School for Public Service.

A training school, for the purpose of fitting men and women for the rendering of more efficient public service, has recently been established in New York City and is being conducted under the direction of the New York Bureau of Municipal Research. The work is largely "laboratory" in character, intended as the course is to give practical experience in the many fields of public endeavor. Opportunities for actual work are given in budget making, standardization of supplies and of salaries, surveying city health organization, etc.

The first Annual Report for 1912 states the purpose of the school to be as follows:

"1. To train young men of executive ability for the study and administration of public business;

"2. To meet a growing demand for students and administrators able to test the efficiency of present methods of municipal service and to introduce improved methods;

"3. To work out and publish handbooks on various departments of public service and methods of testing and increasing the efficiency of public service in all departments;

"4. To furnish a municipal literature for the use of graduate students in schools and colleges;

"5. To emphasize the need for special training on the part of city officials and employees."

National Carelessness.

Under this title the *Boston Journal* for March 6, spoke editorially as follows:

"Of 1,500,000 persons who die in the United States every year, 630,000 perish from preventable diseases, according to a report issued by representatives of life insurance companies.

"These figures are pronounced in the report to be 'almost incredible,' and, in truth, they are. According to the view of the life insurance experts, they are due in part to the gross carelessness of public authorities and partly to the woeful lack of a proper spirit among the people themselves. The worst difficulty comes from lamentably incomplete registration of disease and death, making it impossible to detect general causes promptly and remove them.

"But there is another serious evil which lies at the bottom of much of the trouble—false pride in communities. 'The smug self-satisfaction of most American towns as to their healthfulness,' it is stated in the report, is the reckless folly of ignorance. For generations we have believed that all rural districts are especially healthful. Statistics conclusively demonstrate the folly of this assumption.'

"An awakening to national laxity in these respects would help the insurance companies, but it would help the insured still more."

Social Legislation in Illinois.

A board of directors representing the federation of social agencies in Chicago has recently been elected, for the purpose of acting as a clearing house for bills intended to improve social conditions in Illinois. *The Survey* for March 8, 1913, announces the following to be the proposed activities of the new board:

"1. Gather information as to what is needed, and

"2. Find out what is done elsewhere and how this has worked, thus building up a sort of reference bureau on social legislation.

"3. Submit proposed measures to experts in their respective fields and to advisory committees of lawyers.

"4. Watch proposed legislation and notify those interested as to the proper time for submitting information or urging action.

"5. Encourage the enforcement of social legislation.

"6. Study the administration and effects of such legislation and make recommendations for further improvements."

Lead Poisoning.

Indicative of the widespread interest among laymen in industrial disease is an article on "The Lead Menace" by Gordon Thayer in the March *Everybody's*. It is also illustrative of the opportunities which now present themselves to the casual, unscientific reader, for obtaining attractively presented, yet accurate information on subjects vital to the welfare of the democracy and of its citizens. Gordon Thayer speaks on this subject with an authority based on much actual work as an investigator into the leaded trades in New York City. The article, while presenting little that is new to anyone familiar with industrial disease, is nevertheless one of those highly to be commended, popular educative efforts without which legislative industrial reform in a democratic country is an impossibility.

State Funds to Mothers.

"The way to get reformers into public life is to have a public life for them to go into." William Hard, in *The Survey*, March 1, presents a very convincing argument in favor of the extension of the States' powers and activities, especially in respect to the care of dependent mothers, that field so long given over into the hands of private philanthropy. The article is indicative of the fact that there is beginning to be a widespread recognition of the states' responsibility to the women who bear and rear its future citizens. Mr. Hard objects to the terms "worthy or unworthy," "dependents," etc., so commonly employed by, and perhaps inevitably associated with, private charity. He appeals from the use of private charity visitors, etc., as advocated by Mr. Carstens in a recent *Survey*, to the utilization of state funds to cover the same needs. He justifies this attitude on the rightness of the principle as well as on the efficiency of the device. "Even the best of us have principles," says Mr. Hard, and further:

"Mr. Carstens would improve the situation by whipping up the business man in his capacity as philanthropist. I would whip up that same man in his capacity as taxpayer. From his own standpoint, incidentally, and for the good of his own soul, since he has to pay the bill anyway, and ought to pay it, I would have him do so in the manner least calculated to tempt him toward thinking that he is performing an act of moral grandeur when he is really performing an act of elementary civic routine."

The attitude which society should maintain toward the "dependent" mother, unfortunately socalled, is admirably expressed in the following words:

"'We no longer consider it desirable to drive the mother out to her charing work if we possibly can, *nor do we consider her degraded by receiving public money. We cease, in fact, to regard the public money as a dole; we treat it as a payment for a civic service; and the condition that we are inclined to exact is precisely that she should not endeavor to add to it by earning wages, but rather that she should keep her home respectable and bring up her children in health and happiness*. . . .

"To call such a person a 'dependent' is to me as monstrous as to call the librarian of Congress a 'dependent.' He is paid for his work; she for hers. And she should be paid by those for whom she does it,—all the citizens of the state, not the subscribers to the charities."

Rural Death Rates.

The work of the commission recently appointed by the governor of New York State to investigate rural health conditions in that state was commented on editorially by the *New York Press* on February 19, 1913, as follows:

"The report of the special public health commission, under Doctor Biggs's chairmanship, is one of the most suggestive and enlightening documents that have been submitted to the governor of this state for some time.

"One of the commission's functions has been to 'get after' the bad health conditions that prevail in the rural regions. This report has an interesting chart which presents readily to the eye these significant facts: The death rate in the cities of this state has been steadily falling for many years. Since 1904 it has dropped from 1,915 per 100,000 of population to 1,466. But in the rural and village communities of the state the death rate has risen just as steadily. In 1902 the rural and village death rate per 100,000 in this state, was 1,404; in 1910 it had risen to 1,627, and in 1912 was 1,521. The rural and village death rate is now higher than that of the cities.

"The public health commission proposes

the abolition of the town and village boards of health. These boards never do anything but meet, and, 'there being no business before the board,' adjourn. One town health board was found which in two years had absolutely performed no other act than to pass an order restraining one man's pigeons from roosting on another man's barn.

"It is no wonder that the 'healthy country' is now less healthy than the city."

The Eight-hour Day.

"Congress seems to be on the eve of enacting an eight-hour law applying to women employed in all industries except household work and trained nursing in the District of Columbia. Three states have enacted eight-hour laws for women. In Washington and California the state supreme courts have already sustained these laws, and the most recent statute, that of Colorado, was adopted by a popular vote under the initiative and referendum.

"These familiar facts are rehearsed here because they raise the question why no New England state has established the eight-hour day even for children—and why no southern state except Mississippi? In sixteen states working children have the eight-hour day. In Ohio it applies to girls until their eighteenth birthday. In New York it assures to all boys and girls under sixteen, employed in manufacture, a working day ending at 5 p. m. sharp. In Utah and certain other states boys share with men the eight-hour day in the mining industry.

"With forty-two legislatures in session it seems reasonable to hope that New England and the South may awaken, and begin during the present year to adopt the eight-hour day at least for the children."

Florence Kelley in *The Survey*, February 22, 1913.

Health Administration and Communicable Disease.

"For purposes of public health administration, cases of the communicable diseases may be divided into four groups, namely: First, the well-marked cases; second, the mild, concealed cases; third, the mild unrecognized cases; and fourth, the well, or apparently well, carriers. To prevent the spread of these diseases control of all four groups is necessary. The control of only the first group by quarantine or other means, a practice by no means uncommon, is of little value in preventing the spread of these diseases, as the well-marked cases usually come less in contact with others than do the cases of the other groups, and are likely, therefore, to be less potent factors in spreading infection. The well-marked cases are presumably usually reported. The mild cases should also be reported. The notification of the cases in the first two groups should enable a well-organized health department to discover most of those in the other two by a careful study of the conditions under which the reported cases occur. To find the unrecognized cases and carriers, to which is largely due the spread of the communicable diseases, is a prime duty of the health officer. The accomplishment of this requires intelligence and watchfulness and will be possible in proportion to the completeness with which the recognized cases are reported."

Public Health Reports, January 3, 1913.

An Institute for Dietetics.

"There exists at Paris a *Société scientifique d'hygiène alimentaire et d'alimentation rationnelle de l'homme.* In pursuance of the purpose for which it was chartered this society is to build an institute for the study of the hygiene of nutrition. This institute will be a center not only of research and of teaching of the applied sciences of nutrition, but also of popular education, where instruction will be given in simple terms, and principles necessary for the solution of practical dietetics will be taught. The department of research will comprise laboratories necessary for the study of all the sciences bearing on the general purposes of the society. The latter will construct along this line a room for the calorimetric determination of respiration (*a chambre respiratoire calorimétrique*). In addition to the meetings exclusively for members, the society will have scientific and popular conferences, the latter as far as possible practical demonstrations and object-lessons, so that all may understand the meaning of dietetics. Finally a bulletin will be published which will be a permanent record of all the transactions of the society and experiments done in connection with dietetics. The constitution of the society prevents it from considering industrial and commercial questions and enjoins its members from using, naming or recommending in any way commercial products."

The Journal of the American Medical Association, February 8, 1913.

The Sage Foundation's New Department.

The Department of Surveys and Exhibits of the Sage Foundation is a new one, having been opened last October with Shelby M. Harrison in charge. E. G. Routzahn, well known to sanitarians for his exhibit work and his connection with the anti-tuberculosis movement is the associate director. The work of the department in its first three months has been largely advisory—defining the first steps toward the organization of representative backing groups for both surveys and exhibits, assisting in the selection of subjects to be covered, estimating probable costs, and so on. The demands made on the department by cities throughout the country have already been so heavy that it has been found necessary to add two new members to the staff. Zenas L. Potter, a graduate of the University of Minnesota and Columbia, and a man with special training and experience in sociology and economics, who will aid the staff in these fields, and Mr. Franz Schneider, Jr., who will devote himself to questions of municipal sanitation and Board of Health organization and administration. Mr. Schneider was formerly instructor in the Department of Biology and Public Health at the Massachusetts Institute of Technology and Research Associate in the Sanitary Research Laboratories. He has lately been Health Officer in Wellesley, Mass.

Antityphoid Vaccination in Children.

In the *Journal of the American Medical Association* for February 1, 1913, Dr. F. F. Russell, of the United States Army Medical Corps, presents some interesting statistics derived from 359 cases of antityphoid inoculation in children in the United States. In Doctor Russell's opinion the inoculation as a preventive measure is both necessary and highly desirable for children and young adults, especially when leaving home for summer vacations, schools and colleges. In the cases studied no harmful effects are reported, none have contracted typhoid fever, and both the local and general reaction are less marked than in adults. The dosage is based on weight and not on age. Revaccination should be undertaken earlier than in adults. The importance of this subject may be judged from the statistics of the Bureau of the Census, which show that in 1909 there were 3,366 deaths from typhoid in the registration area in patients under twenty years of age. Of this number 1,192 deaths occurred in patients under ten years of age. A very large proportion of these could undoubtedly be prevented by the use of the vaccine.

Organized Medicine vs. Organized Quackery.

The January number of the *New York State Journal of Medicine* contains a striking article by William J. Robinson, M. D., on the proposed National Department of Health. Doctor Robinson depicts in convincing terms the spirit of deliberate misrepresentation which inspires the so-called "League for Medical Freedom," and concludes with the following admirable summarization:

"1. The most important task that the true liberals and radicals have to accomplish is as quickly as possible to get a divorce from quackery. They must learn that quackery is masquerading in a false garb, that it does not represent liberal and progressive tendencies, but stands for ignorance, reaction and obscurantism.

"2. A National Department of Health would deal only with the large affairs of public health, prevention of epidemics, quarantine, pollution of streams, etc. Its purpose is to coördinate the existing bureaus of health in order that matters of public sanitation may be attended to more expeditiously and more effectively.

"3. A National Department of Health could not and would not interfere with any school or system of medicine or any sect. Regulation of the practice of medicine is purely a state function, with which the federal government has nothing to do.

"4. It is not our intention or desire to interfere with anybody's method of treatment. All we want is that those who wish to treat the sick should show their competence for this delicate life-and-death work.

"5. The National League for Medical Freedom has set up a man of straw to act as a scarecrow to the gullible and weak-minded. It is trying deliberately to deceive and mislead the people. I do not like to say it, but as it is true, I must say it.

"6. And last but not least, I would like you to carry this thought away with you. The fight is not between a mythical medical trust and medical libertarians, between medical tyranny and medical freedom; the fight is between progressive, scientific medicine on the one hand and organized quackery on the other. The National League for Medical Freedom is misusing the last word of its title; it should change the word 'Freedom' to the word 'Quackery' and then the world will know just what it stands for."

Sir Thomas Oliver and American Industrial Conditions.

The Survey for January 4 contains an article by Sir Thomas Oliver, M. D., in which he presents his observations on our factory conditions, the result of a tour made in the autumn of 1912. Perhaps the most interesting and significant of Doctor Oliver's conclusions are those concerning the employment of women. He says that of the things which particularly struck him in his visit perhaps the most impressive was the enormous employment of female labor. To quote him on this subject:

"Factory life does not tend to the development of those traits which make home attractive. It does not encourage marriage and by it maternity is discouraged. What is to become of the women when they reach the age of fifty? Replaced by younger hands and with no longer a place for them in the factory or office, with memories only of good wages spent neither wisely nor with a view to the future, for such women as remain unmarried will the discontentment be greater or less than is the experience of middle age generally? For those who have saved and been thrifty the years after fifty may well become the enjoyable evening of a well-spent and active life, but for those who have not saved, occupation gone, family ties broken and no home life available, the prospects are anything but attractive and reassuring.

"The American nation too will have lost considerably by having utilized in the production of mere material wealth the best years of a great part of its available womanhood when the nation itself is so much in need of sons and daughters born under the flag and reared in the traditions of all that has made the United States powerful, progressive and enduring."

Research Bureau for Baltimore.

"The Maryland Bureau of State and Municipal Research which has opened offices at 728 Equitable Building, Baltimore, differs from research bureaus created elsewhere, in that it expects to study the work of state as well as municipal departments and institutions. The bureau is under the direction of a board of trustees, representing a small group of Baltimore men who have contributed sufficient funds to give the municipal research idea a trying out in Maryland. W. H. Maltbie, an attorney of Baltimore, is director.

"Its first investigation in Baltimore is being made in connection with the inspection of weights and measures. Under the Baltimore city charter this inspection constitutes a sub-department of the work in the comptroller's office. Work on other investigations will begin shortly."

The Survey, January 11, 1913.

Social Welfare in Massachusetts.

Indicative of the awakened interest in social progress is the recently created committee of the Massachusetts Legislature which is to concern itself with "bills and petitions dealing with the welfare of the individual in his relation to the state and to society." According to the *Survey* for January 18 the committee on Social Welfare is the result of the activities of Speaker G. D. Cushing of the Massachusetts House of Representatives. The speaker "emphasized the unmistakable indications given by the election of 1912 that the people are vitally interested in legislation for the social welfare." Matters which previously have been scattered among diverse committees and which have failed to receive the consideration to which their importance entitles them may now be received by a committee appointed for the definite purpose of handling proposed social legislation.

"As illustration of the legislation which the committee will be called upon to consider the bills already introduced and referred to it can be cited:

"To provide for an investigation of white slave traffic and like evils.

"To provide for investigation of the employment of women workers in the commonwealth.

"To provide for employment of prisoners in the improvement of waste land and in other outdoor labor.

"Relative to appointment of agents by the board of prison commissioners.

"To provide for a minimum wage for state laborers.

"Three bills providing for old age pensions.

"To provide for a maximum nine-hour day for women, in industries other than those covered by the present law.

"To limit to five hours the labor of children between fourteen and sixteen years of age.

"To investigate health, safety and general conditions in all industries."

Preventable Infant Deaths.

"In Montgomeryshire during 1911, of 106 infants who died before reaching the age of 12 months, 48 succumbed to diseases which may reasonably be ascribed to errors of feeding, and 25 to prematurity or debility at birth. In one district 18 deaths out of 28; in another, 8 out of 12; while in a third, 6 out of 8 were due to one or other of these two causes. In this connection the county medical officer (Dr. C. E. Humphreys) writes: 'I do not agree with the statement in one of the reports that the loss of these children is 'not one to be altogether mourned.' I have during a long experience of private practice seen such infants, when placed under better conditions of feeding and nurture, grow up into fine specimens of robust, healthy children. Even in those districts where infantile mortality is low, it is not the lowest attainable when we find a considerable number of the deaths are due to causes which are clearly preventable. It is for this reason that I press for the adoption of the Notification of Births Act in those areas of the county where the necessary means are at hand for carrying out the provisions of the Act.' "

The Medical Officer, February 8, 1913.

Insurance Companies and Boards of Health.

Eugene L. Fisk, M. D., speaking before the American Association for the Advancement of Science, in Cleveland, January 3, 1913, expressed very effectively the attitude of socially-minded insurance men toward health boards and other health agencies. On this subject Doctor Fisk said:

"Life Insurance companies can render a valuable public service by upholding the health officer in the performance of his duty, and by urging policyholders and the public to require a high grade of ability in such officials, to properly equip them with laboratories, etc., and to pay salaries that will command the right kind of service. In communities where the companies are sustaining a high mortality because of backward civilization and gross sanitary neglect, their experience may serve as a lesson to the agents, medical examiners and prominent policyholders in such sections, and swing them into line for sanitary reform. The passage of laws for the proper registration of births and deaths in the non-registration states could be materially expedited by vigorous work on the part of the life-insurance companies. Even now the Association of Life Insurance Presidents is moving in this particular matter. . . .

"A life-insurance company should also

encourage the formation of health leagues throughout the country, to serve as foci of education and of active effort for sanitary reform, and for the encouragement of higher standards of personal hygiene, Cooperation with such leagues, by furnishing material, information, suggestions, etc., would bring the public and the company closer together, and in every way prove mutually beneficial."

Housing in the National Capital.

The American City for February, 1913, comments editorially as follows on the alley slums of Washington:

"Turning to the darker side of Washington's housing problem, how many cities can compete with the record, made by its alley slums, of a death rate within the first year of life of one child out of every three born? Do the American people generally realize that there are still in their capital city 275 blocks of these blind alley "homes," containing 3,337 dwellings and approximately 16,000 inhabitants? And do they know that, to make matters worse, these houses, with their diseases and crime, fill the center of many blocks rimmed with splendid houses and hotels?

"Attention was called to these facts in a recent issue of *The Survey*, by Dr. Thomas Jesse Jones, of Washington. It is shown that:

"Objectionable and dangerous as these alleys have been since the Civil War, the history of the effort for legislative treatment of the condition is a story of forty years of struggle which has borne but comparatively little fruit. On almost every occasion the forces of selfishness have succeeded in overthrowing any appeal to Congress for a systematic treatment of all the blocks infected with these by-ways."

Malaria Carriers.

The Bulletin of the Florida State Board of Health for February points out that "those who protect themselves against the bites of mosquitoes escape malaria." Furthermore the anopheles bites only at night and this makes it the easier for one to afford efficient protection. It must be remembered that the mosquito must first be infected and this can be prevented by screening the malaria patient. The patient with malaria cannot infect mosquitoes during the first two weeks of his disease, and if prompt curative measures were used at the start, there would be no further transmission. If the patient is not completely cured, but is well enough to go about, still having the parasites in his blood, he becomes a very efficient malaria carrier and is capable of infecting mosquitoes continuously.

Cleveland's Bureau of Occupational Diseases.

"The Board of Health has recently established a Bureau of Occupational Diseases, for the investigation of these diseases in Cleveland, under a properly qualified director, in order that measures directed towards their control should be established on a basis of facts. Their action is in line with the growing appreciation throughout the United States that our knowledge of the conditions under which many of our industries are carried on is of the vaguest description. The widespread character of this appreciation is shown by the federal action in controlling the kind of phosphorus used in the manufacture of matches, the state action in establishing commissions in several of the states for the reporting of their incidence by physicians, and by the municipal action of several of the large cities in requiring a similar reporting of cases. While the logical sequence is of course reporting, investigation of the results indicated by the reports, and attempts to improve the conditions, it is not always practicable to follow this order. It is an unfortunate fact that the average physician does not take the reporting of disease seriously, and our statistics and information even about the reportable diseases are thereby decreased in value, so that unless interest in the reporting of the occupational diseases is stimulated the mere list of reported cases will be no more at the best than an indication. State commissions are hampered by the magnitude of the task of reaching all the places concerned with even one industry, and the efficiency of the investigation may be hampered by a great variety of conditions.

But if the larger manufacturing centers established bureaus of the type just established here, obtained the services of a competent director, and the coöperation of the profession, so much could be accomplished even in the absence of an ordinance requiring reporting industrial diseases, that in short time the passage of the ordinance would follow as a matter of course.

"That Cleveland should be active in this matter is especially suitable, on account of the large growth of the city in the last few years, and the great increase in many industries which involve occupational dangers, such, for instance, as the automobile industry. Clinicians have noted a conspicuous increase in the number of cases of lead poisoning and other similar conditions, and unless improvements are made this increase will be progressive."

Editorial (in part) in *The Cleveland Medical Journal,* December, 1912.

A Health Almanac.

The December *Bulletin of the Kansas State Board of Health* is published in the form of an 1913 Almanac, and is as popularly convincing and attractive as it is unusual. "Good Health for every day of every month" is emphasized by a combination of historical statements and sanitary maxims, while the calendar for each month is accompanied by an appropriate discussion in popular style of the preventive methods available against diseases particularly prevalent in that month. "First Kansas Decoration Day proclamation, 1871," is followed by "From flies and filth to food and fever." The pages for May, for instance, are given up to "Good Wells and Good Water Make for Good Health." The following rules on wells and springs are illustrative of the practical value and utilitarian character of the Almanac:

"1. The well must be not less than 15 feet deep. As a general proposition, the deeper the better.

"2. The top must be sound and tight so that no water which falls on it can drip back into the well.

"3. The well should be provided with a pump or with a bucket which empties itself and does not have to be touched. The double bucket is always dangerous.

"4. The ground immediately around the well should be sloped up to the well and banked with clay or covered with cement, so that all water spilled around the well will run off and not trickle back.

"5. The well should be cased with brick or with a terra cotta pipe and the space back of the casing filled with sand.

"6. A spring in a limestone county can not be so protected as to make it perfectly sure that it does not come from underground streams at a place far from the well.

"7. The spring should be so protected that water can not wash into it from the hillside above or from the platform below. This is best done by cementing or stoning the curbing at least a foot above the ground all around and putting in a pipe for the overflow. All water should then be drawn from the overflow pipe, and not by dipping buckets or dippers."

The Proposed Amendment of the New York State Labor Law.

From the health standpoint the most important sections of the bill recently introduced into the New York State Senate proposing the reorganization of the State Labor Department are those which would establish a Division of Industrial Hygiene and a Division of Medical Inspection. The section referring to the Division of Industrial Hygiene may be quoted in part as follows:

"The members of the division of industrial hygiene shall make special inspections of factories, mercantile establishments and other places subject to the provisions of this chapter, throughout the state, and shall conduct special investigations of industrial processes and conditions. The commissioner of labor shall submit to the industrial board the recommendations of the division regarding proposed rules and regulations and standards to be adopted to carry into effect the provisions of this chapter and shall advise said board concerning the operation of such rules and standards and as to any changes or modifications to be made therein.

The members of such division shall prepare material for leaflets and bulletins calling attention to dangers in particular industries and the precautions to be taken to avoid them; and shall perform such other duties and render such other services as may be required by the commissioner of labor."

The bill describes the Division of Medical Inspection to be established as follows:

"The section of medical inspection shall inspect factories, mercantile establishments and other places subject to the provisions of this chapter throughout the state with respect to conditions of work affecting the health of persons employed therein and shall have charge of the physical examination and medical supervision of all children employed therein and shall perform such other duties and render such other services as the commissioner of labor may direct. . . .

"The Division of Industrial Accidents and Diseases shall collect, assort and systematize statistical details and general information regarding industrial accidents and occupational diseases, their causes and effects, and methods of preventing, curing and remedying them, and of providing compensation therefor."

The work of these divisions is to be carried on by inspectors of what are to be known as the sixth and seventh grades:

"Inspectors of the sixth grade, of whom there shall be not less than three and one of whom shall be a woman, shall act as medical inspectors and shall each receive an annual salary of two thousand five hundred dollars; inspectors of the seventh grade, of whom there shall be not less than four, shall each receive an annual salary of three thousand five hundred dollars; all of the inspectors of the sixth grade shall be physicians duly licensed to practice medicine in the state of New York. Of the inspectors of the seventh grade one shall be a physician duly licensed to practice medicine in the state of New York, and he shall be the chief medical inspector; one shall be an analytical chemist; one shall be a mechanical engineer, and an expert in ventilation and accident prevention; and one shall be a civil engineer, and and an expert in fire prevention and building construction."

If this bill should become a law the state of New York will place itself in the front rank with those who recognize the necessity for an attack upon the most vital manifestation of our industrial maladjustment.

Plague from a Pet Rabbit.

"How three apprentices on board ship died as the outcome of playing with a pet rabbit was told by Dr. W. E. Harker, medical officer of the Tyne Port Sanitary Authority, at the annual meeting of the Association of Port Sanitary Authorities in London last week. There was no doubt, he said, that the rabbit caught plague from infected rats which were on the ship, and that the lads took the plague from the rabbit. An apprentice who had nothing to do with the rabbit escaped. When the ship reached port the rabbit was seen to be infested with fleas, and it died shortly after. The body was sent to the destructor."

The Medical Officer, February 8, 1913.

Cause of Beriberi.

"Gouzien has been studying the records in regard to beriberi in the penitentiary at Hanoi in French China from 1906 to 1910. He concludes that rice undoubtedly plays a very important part in the pathogenesis of the disease, but that the superiority of the unhulled to the polished rice does not lie in any antitoxic effect of the hulls but in the fact that they protect the grain against degeneration from heat and moisture. He considers the disease an intoxication, not an infection, and cites in support of this theory the fact that a very severe epidemic of berberi was followed by an epidemic of scurvy, the latter disease attacking only those who had been affected by the former. The two diseases seem to be in a sense interchangeable. Moreover, even when polished rice of the same quality is used, marked decrease is noted in the epidemic when the diet is varied by a free use of fresh vegetables, fruits and meat. In addition to the dietetic factors, overcrowding and dampness seem to play an important part in the course and severity of the disease. Gouzien is at the head of the medical department of the French army in Tonquin, and his article is published in the *Annales d'Hygiène et de Médécine Coloniales*, 1912, xv, 3."

Journal of American Medical Association, January 25, 1913.

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THE NECESSITY FOR UNIFORMITY IN NATIONAL, STATE, AND MUNICIPAL VITAL STATISTICS REPORTS.

Dr. Cressy L. Wilbur,
Chief Statistician, Bureau of the Census.

Read before the Joint Session of Sections of Municipal Health Officers and Vital Statistics, American Public Health Association, Washington, D. C., September, 1912.

A very important paper entitled "Misleading Mortality Statistics on Tuberculosis" was read before the recent meeting of the National Association for the Study and Prevention of Tuberculosis by its assistant secretary, Dr. Philip P. Jacobs. I wish this paper, with the permission of the former association, might also be printed in our proceedings, because I believe that it brings forcibly before us, and especially before the municipal health officers now present, some serious discrepancies that ought to be removed. In fact, it represents an alarming condition with respect to the publication of unreliable data, especially in our city reports, that should have been taken up long ago by the Section on Vital Statistics, but which I believe cannot be dealt with to advantage without the practical coöperation of the Section of Municipal Health Officers as well. It is not creditable either to the registration officials of the country or to the state and municipal health officers that these discrepancies should be taken up for the first time publicly by one who is in no wise concerned with the preparation of such statistics, but only with their intelligent use. I do not wish to shirk any responsibility of the Census, but in fact the Census has been endeavoring for quite a number of years, through the organization of registration officials as a section of this Association and the adoption of Rules of Statistical Practice thereby, through the use of monthly check lists, so that the total transcripts received by the Bureau for each month shall agree with the state or city count, and through the publication of Manuals of the International Classification of Deaths, to bring about a greater degree of uniformity in the published results.

The Report on Mortality Statistics, 1909, gives consecutive rates for important causes of death for all the registration states and cities of 8,000 population and over for each of the years 1900 to 1909, and the series is brought up to 1910 by the *Bulletin* for that year. State registrars and municipal sanitary and registration officials can readily make comparisons of these published rates with those given in their reports, and discrepancies of any consequence should rigidly be investigated and corrected. The Census, however, feels that it can stand upon the correctness of its published rates, as based upon the officials returns from state and city officers. In all cases, so far, in which they have been called into question, examination of the original records has shown that the Census figures were correct and that the local rates were in error. There was a degree of apparent injustice, therefore, attaching to Doctor Jacobs's original, and very natural, conclusion, which I believe has been eliminated from his paper, that whereas three sets of official death rates, namely, the federal, state, and municipal, relating to the same city and for the same time, did not agree, therefore *all* were unreliable. It is possible, and I believe it to be true, that where the three sets of figures do not agree, the federal rates may and should be accepted in all cases—and I leave the burden of proof to the contrary to state and city officials—as the correct figures, truly representing the official transcripts made by the state and city authorities, and compiled, with the utmost care and checking for possible errors of statistical procedure, according to the rules of the International classification of causes of death (First Revision, 1900–1909; Second Revison, 1910–). But of course the Census compilation can not be more correct than the transcripts received, and if state or local officials failed to transmit all the deaths on file with them, or perhaps duplicated certain transcripts, the results will be in error as compared with the original records.

As a matter of fact, slight differences must occur in any two or more independent statistical compilations of the same data. When made in different offices and involving any considerable number of deaths, it is practically impossible that the results should be in exact numerical agreement. Vital statisticians are not the only public health workers to be troubled by discrepancies arising from differences in methods. We have felt greatly pleased when our certified milk contained less than 10,000 bacteria to the cubic centimeter according to the ordinary plating methods of examination, but now we learn, from the report of the Commission on Milk Standards of the New York Milk Committee, that 5,000 bacteria by the plate method may correspond to 700,000 by the method of centrifugalization and 5,000,000 by the Prescott-Breed method of microscopic examination. Thank Heaven we have no such alarming discrepancies to reconcile in our vital statistics, although Doctor Jacobs finds that the tuberculosis rate for Binghamton, N. Y., in 1902, was 219.4 per 100,000 by the Census report, 48.7 by the state report, and 197.4 by the city report; likewise, for 1909, the figures disagreed, being as follows: Census, 124.5; state, 75.9; city, 113.9. (I have only taken a single city for two of the years showing the most marked differences, and have also written the rates per 100,000 instead of per 10,000.)

In this specific case, which may be taken as a type of numerous others, the low rate given by the state report, or rather computed by Doctor Jacobs on the basis of the Census estimates of population, arose from a clerical error in a certain table by which the number of deaths from consumption in Binghamton was given as 26 instead of 90, as shown by the Census and also by the state report from summation of the tables of deaths by months. The exact agreement would not necessarily follow because the Census deaths were those that actually occurred during the year 1902, while the state figures related to a compilation of reported deaths up to the 15th of the following month and one perhaps not closed until some time thereafter, so that some deaths in January, 1902, might be omitted and some deaths in January, 1903, might be included in the total for the year 1902. Ordinarily these would offset each other and the difference between the reported deaths and the deaths that actually occurred would be of no consequence. Reference to the main table of the city report shows that the number of deaths compiled from pulmonary consumption was 89 (216.9 per 100,000), a number which is necessary to balance the table, although the detail by months foots only to 84 (204.7 per 100,000). Doctor Jacobs's rate of 197.4 would correspond to 81 deaths. His figures were not obtained from examination of the official reports for the year, but were furnished by the officials upon a blank sent them for this purpose. A manuscript table prepared by Dr. Daniel S. Burr, health officer of Binghamton in 1909, gives the deaths from tuberculosis of the lungs in 1902 as 81; the detail by months does not agree with that printed in the report for 1902, sometimes one and sometimes the other being in excess. Thus for April, the manuscript report gives 12 deaths while the printed report gave only 7. To ascertain the reason for these differences would require an examination of the original certificates of death.

For the year 1909, the matter is further complicated by the practice of the state office, beginning about 1905, of rejecting deaths in state institutions. In the Census compilations, and also in the city tables, all deaths that occurred in the city are included, in accordance with the Rules of Statistical Practice approved by the American Public Health Association. The Census showed 59 deaths, the state compilation (exclusive of deaths in the State Hospital for the Insane), 36, and the city, 54. The difference between the Census and city figures may perhaps be due to variations in the assignment of joint causes. The comparison of the discrepancies in these two instances illustrates well, however, the perplexities that the statistical student must encounter and the impossibility of reconciling them except by an examination of the original records. The comparison is also rendered unreliable in some cases by failure to differentiate deaths from tuberculosis (all forms) and deaths from tuberculosis of the lungs, although I believe that the Census figures are correct according to the transcripts supplied, I should hesitate to denounce other figures as certainly incorrect until I have been able to check up the original records. This, of course, it has been impossible to do, except in a few cases, with the force available, and I therefore wish to urge upon this meeting, both from the point of view of vital statisticians and as general sanitary administrators, that some work be actively undertaken on this important subject. We can not afford to have our data impeached, if trustworthy; and if the figures are wrong and the compilations incorrect in any instance, then the sooner that correct figures are obtained, the better. Compliance with the Rules of Statistical Practice adopted by this Association is essential, and also with the standard methods of classification of causes of death. Some offices are ignorant of, or disregard, these rules. Deaths are excluded from their general tables for a variety of reasons, none of which have yet been sanctioned by the Section on Vital Statistics. Populations continue to be estimated by various methods, and death rates are stated in a variety of forms. I believe that it would be wise to appoint an active committee to report on the degree to which the Rules of Statistical Practice are carried out in the various state and city offices, and that an effort should be made to bring up our data to a fully comparable standard.

I have prepared a memorandum as a supplement to this paper in order to show some of the possible causes of discrepancies between the death rates published by various offices. Incidentally it shows the necessity of thorough training in the technique of statistics, greater stability and responsibility for the position of city registrar, and the entire removal of this work, together with all other public health work, from the field of politics. A man subject to partisan appointment and removal can not be expected to fit himself for permanent, progressive service, and can hardly be blamed if the results of his untrained efforts at the compilation of causes of death are sometimes weird.

MEMORANDUM ON SOME POSSIBLE CAUSES OF DISCREPANCIES BETWEEN DEATH RATES PUBLISHED BY THE CENSUS BUREAU AND THOSE PUBLISHED IN STATE AND CITY REPORTS.

The death rate is obtained by dividing the number of deaths by the population, the resulting fraction being multiplied by 1,000, 10,000, 100,000, or 1,000,000 in order to afford a more convenient form for statistical use. A difference in rates shown for the same area and time may be due to a difference in population, in the deaths, or in both population and deaths. Discrepancies due to population may readily be adjusted by the adoption of a uniform basis of estimation (see below), but those due to differences in the compilations of deaths or causes of death are more serious and may require a recompilation or critical examination of the original records.

Population.

The American Public Health Association has recommended ([A.P.H.A.] Rule No. 44 of 1908) relative to the constitution of standard tables of vital statistics that "Every state or city registration office publishing an annual (or biennial) report should include therein a table showing the population (as estimated by the United States Census Bureau for intercensal years). . . . "

Hence, the Census estimates of population may be taken as the standard and it is incumbent upon each state and city office to use them, or at least to explain why any other estimate is employed. As the rule was adopted as recently as 1908, it is true that some offices have not yet put it into force, and it would not, of course, affect the rates taken from the reports published prior to that time. The Census estimates of population may be found in the annual reports on Mortality Statistics, and advance estimates are always supplied to state or city offices upon request for their current reports.

Census estimates of population are made uniformly according to the arithmetical method or that of the average annual increase between the last two censuses. They are of two distinct kinds, (a) postcensal or provisional estimates made for years subsequent to the last census, *e. g.*, for the years 1901, 1902, 1903, and 1904 as printed in the annual reports for those years (Mortality Statistics: 1900–1904), and (b) intercensal or final estimates interpolated between two census years, *e.g.*, those for the years 1901, 1902, 1903, and 1904 as printed in the annual report for 1905 after the results of the state censuses of 1905 were available. No estimates were made for the census years 1900 and 1905 (for the group of states having state censuses). In a similar way postcensal estimates were carried on for the years 1906, 1907, and 1908, based either on the censuses of 1890 and 1900 or 1900 and 1905 for those states with interdecennial censuses.

All estimates, as well as the populations for census years, were as of June 1 up to and including the annual report for 1908.

The report for 1909, which was prepared after the census of 1910 was available, contained an interpolated intercensal estimate for that year and also revised estimates of population for all preceding postcensal years since, but not including, the last preceding state or federal census. These estimates were, for the first time, made as of the middle of the year (July 1), and not as of June 1. This change was necessary on account of the change of date of the last census from June 1 to April 15, thus rendering it expedient to go upon a midyear basis of estimation in accordance with the general practice of other countries. But the population figures of the census of 1900 and also of the states having censuses in 1905 (Michigan, 1904), together with estimates interpolated between the censuses of 1900 and 1905, were left unchanged as of June 1, the slight difference not warranting a change in what might be regarded as established estimates.

Hence in comparing Census, state, and city estimates, regard must be had to the time when they were made. Some differences from the Census estimates may be due to the use of various methods:

(1) No estimate, rates being based on last census.

(2) Estimate by geometrical method, assuming a constant *rate* of increase.

(3) Estimate based on school census.

(4) Estimate based on names in directory.

(5) Estimate based on increase in number of dwellings, water rates, etc.

(6) Estimate based on a sanguine and optimistic faith in the rapid growth of the city. Generally in round numbers and subject to a sudden collapse after the next census is taken; the erroneous rates are not always revised.

(7) Estimate by arithmetical method but not on midyear basis.

(8) Census method, but postcensal estimates and rates based thereon not revised after next census becomes available.

(9) Use of police census or special enumeration of population.

Deaths.

It is evident that in the statement of the total number of deaths from all causes that have occurred in a given area for a given time, the federal, state, and city reports ought to be in exact agreement. The Census compilation follows strictly the Rules of Statistical Practice approved by the American Public Health Association and presents in its tables, so far as the transcripts show, the exact number of deaths, exclusive of *true* stillbirths, but not excluding deaths for any other reason, that actually occurred during the time stated. The desirability of omitting certain deaths of non-residents may be admitted, but until definite rules have been formulated—and the matter has been before the Section on Vital Statistics for several years without decisive action—it would only lead to confusion to make the attempt in tables intended for general comparisons of mortality. In certain reports wholly unauthorized omissions have been made, which were entirely unknown until the compilation of deaths by minute divisions of ages during the earliest period of infancy revealed them. If exclusions of any kind are made in a city report, the fact and the exact nature of the deaths excluded should be plainly stated, as required by [APHA] Rule No. 14 of 1908. Every office sending transcripts to the Census is required to certify, both for the total number and the number each month, that the transcripts are complete according to the standard rules, and it is only by neglect or lack of comprehension of the rules and instructions that any deaths should be omitted.

Some possible causes of discrepancy in state or city reports as compared with the Census figures for total deaths may be due to:

(1) Improper inclusions of true stillbirths as deaths.

(2) Improper exclusion, as "stillbirths," of children born alive and dying very soon after birth.

(3) Inclusion of stillborn premature births.

(4) Exclusion of premature births that were not stillborn.

(5) Exclusion of deaths of non-residents.

(6) Exclusion of deaths in certain institutions.

(7) Inclusion of deaths of residents dying elsewhere.

(8) Exclusion of deaths from violence.

(9) Loss of originals or transcripts between the city and state office.

(10) Duplication of transcripts between the city and state office.

(11) Omission of transcripts or failure to make transcripts of all deaths for the Census Bureau; such omissions are especially likely to occur in the case of delayed returns from the local registrars to the central office, or even in delayed city returns. The monthly check-list may not show the error because it was compared with the incomplete transcripts, not with the original returns as should be done.

(12) Duplication of transcripts to the Census Bureau.

(13) Elimination of duplicate returns, *i.e.*, correct transcripts of two or more original returns of the same death.

(14) Compilation of deaths as "reported for" a certain time, not as actually occurring during that time.

(15) Compilation of deaths for other than the calendar year.

Causes of Death.

Some of the reasons affecting the agreement with respect to total death may also affect the compilation of individual causes. Other special grounds of difference may be:

(1) Error or voluntary departure from accepted practice in assignment of the cause of death to the International List.

(2) Of course if any other system than the International is used, no agreement can be expected.

(3) Error or bias in selecting the primary cause among two or more causes or conditions reported by the physician.

(4) Failure to change assignments after receipt of corrections.

(5) Failure to transmit corrections.

(6) Illegible transcripts.

(7) Incomplete transcripts.

(8) Use of old classification for 1910 and subsequent years instead of Second Revision of the International List.

(9) Improper or indefinite consolidation in condensed tables of causes of deaths.

In addition to the above, there are, of course, the ordinary clerical and typographical errors to be encountered in preparing statistical MS. and seeing it through the press. All arithmetical operations should be carefully checked and pains should be taken to see that different tables in the same report do not disagree.

THE RELATION OF MORBIDITY REPORTS TO PUBLIC HEALTH ADMINISTRATION.

JOHN W. TRASK,
Assistant Surgeon-General, United States Public Health Service.

Read before the Joint Session of Sections of Municipal Health Officers and Vital Statistics, American Public Health Association, Washington, D. C., September, 1912.

The aim of the sanitarian and the function of the health officer are the prevention of disease. The prevention of disease depends upon three factors: first, a knowledge of the causes of disease and the conditions under which they affect man; second, current information of the occurrence and location of the conditions that produce disease; and third, the application of existing knowledge to the control and eradication of disease wherever it occurs.

The first, a knowledge of the causes of disease and the conditions under which they affect man, is acquired by research and epidemiologic studies. The second, current information of the occurrence and location of the factors producing disease, can be obtained only through the notification of cases of sickness. The third, the application of existing knowledge to the control and eradication of disease, is a matter of efficient public health administration. Any plan for the prevention of disease, the protection of health, the conservation of human vitality, or the prolongation of life must depend for its success upon these three factors, the omission of any one of which renders the others ineffective.

DEPENDENCE OF LOCAL PUBLIC HEALTH WORK UPON MORBIDITY REPORTS.

Given an efficient health department with a knowledge of the causes of morbidity, in so far as these are known, its work will depend essentially upon the extent to which the occurrence of cases of the preventable diseases are made known to it through morbidity reports. While the work of the health officer logically should include the control of all preventable diseases, in the past it has consisted mainly in the control of certain of the communicable ones. The primary factor in preventing the spread of the communicable diseases is a knowledge of the occurrence and location of cases, for each case of a communicable disease constitutes a focus from which the infection may spread and there is no sanitary measure that can be more than partially successful in the absence of a knowledge of the frequency and location of such foci.

The necessity for the reporting of cases of such diseases as cholera, plague, and yellow fever is well recognized.

Typhoid fever is one of the communicable diseases the control of which is most nearly independent of morbidity reports. The installation of an unpolluted water supply usually curtails markedly the prevalence of this disease in cities. And yet pure water alone is not sufficient. There are many examples of cities in which typhoid fever is prevalent in spite of the presence of satisfactory public water. In this disease a knowledge of the occurrence of cases is necessary to locate milk outbreaks, to discover contaminated wells, if such exist, and to prevent the spread of the disease by flies and by contact. Every typhoid fever patient has potential possibilities for harm through the contamination of water and food supplies which may be so far-reaching that it is but proper that an efficient health department should take cognizance of each case.

Tuberculosis will be brought under proper control only after the reporting of cases is universally required and the requirement generally complied with. By far the majority of the cases of this disease receive their infection from some existing human case. Tuberculosis is more or less chronic in character and the patient usually continues as a focus from which the infection may be spread for months and sometimes years. If the disease is to be controlled, the location and activities of those affected must be known that they may be instructed how to conduct themselves so that others may not be unduly endangered, and that those intimately associated with them may be informed regarding the measures necessary for their own protection. It is also important that persons suffering with tuberculosis should not engage in certain occupations when doing so would cause the exposure of others to infection. These things can be accomplished only when the practicing physician reports the cases to the health department.

What is true of the necessity for the reporting of cases of typhoid fever and tuberculosis in the control of these diseases, is to a large measure equally true of the necessity for reporting cases of the other communicable diseases. The manner in which these diseases are spread may differ, the measures to be taken to prevent secondary cases may vary, but a knowledge of the occurrence and location of cases remains of paramount importance.

As regards the communicable diseases, a knowledge of the occurrence of cases is necessary not only to prevent their spread directly from such cases, but also to ascertain the sources of infection, the causes of outbreaks or the reasons for their undue prevalence. Whenever a disease is unusually prevalent or becomes epidemic in a locality, an efficient health department endeavors to find the reasons for it, and inaugurates an epidemiologic investigation. The first step in such an investigation is a study of certain facts regarding the cases that have occurred in order to discover their relationship to each other and the factors that have been operative in producing the disease or its spread. Epidemiology consists largely of a study of cases and case-records.

From the standpoint of sanitary administration it is highly desirable that, instead of unusual conditions being necessary as an incentive to epidemiologic studies, every health authority have the means for constantly studying, within its jurisdiction, the movements of disease, the increase and decline of sickness, the factors operative locally in the causation of morbidity, the best methods of prevention and the occasions when special effort is necessary or most effective. This is possible only to the extent that the occurrence of cases is made known to the health department through notification.

Dependence of State, National and International Public Health Work upon Morbidity Reports.

Although the most important function of morbidity reports is the information they give to the local health department having immediate jurisdiction, this constitutes only a part of their usefulness. The occurrence and prevalence of disease in a city, township or county has an important bearing on the welfare of every other city, township, and county within a state, and it is only proper that each community should be kept currently informed of the existing prevalence of disease in every other community within the state. This is best accomplished through the state department of health. In most of our states the laws require that local authorities shall report the occurrence of certain diseases to the state department. It is only by this means that a state department of health can keep informed of the sanitary conditions and the prevalence of disease throughout its jurisdiction. Without such information a state department of health cannot perform its most important functions and constitutes a health department largely in name only.

Nor does the information regarding the prevalence of disease required by a state health department in the proper protection of the sanitary welfare of the state end with a knowledge of the occurrence of disease within its own territory. Just as it is important that a city health department shall know of the occurrence of disease in neighboring cities and communities, so is it important that state health departments shall know of the occurrence and prevalence of disease in neighboring states. This includes all the states, for rapid transit has made California and Maine as truly neighbors as were New York and Massachusetts a century ago.

As the communities within a state report to the state department for its information and for the information of each other, so for the information of state authorities it is necessary that the state health departments report to some common agency, national in scope, the occurrence of diseases in their respective territories.

Action was taken at the last annual conference of state and territorial health officers with the United States Public Health Service, having as its object a coöperative plan by which the state authorities are to keep the Public Health Service informed regarding the occurrence and prevalence of certain diseases within their respective states. This information will be published in the public health reports for the benefit of all state and territorial health authorities. When there is reason for doing so, as in the event of the acute outbreak of certain diseases, the state health officers will be advised of such outbreak by telegraph. A copy of the resolution adopted by the conference will be found on page 427.

The usefulness of morbidity reports extends still further. The need for the notification of the occurrence of certain diseases extends even to international sanitary administration. If a country wishes to prevent the importation of diseases from other countries, it must know the localities in foreign countries where these diseases occur.

The international sanitary convention signed at Paris in 1903, provides that each government shall promptly notify the other signatory nations whenever cases of cholera or plague appear anywhere within its territory. These primary notifications are to be followed by detailed reports of the measures being taken to control the disease and by reports at least once a week showing the course of the outbreak or epidemic. By this same convention an International Office of Public Hygiene has been established at Paris to furnish to the signatory governments current information regarding sanitary affairs and the prevalence of certain diseases throughout the world. The International Office issues for this purpose a monthly bulletin. The provisions of this convention regarding notification, and a list of the governments signatory thereto will be found on page 429.

The International Sanitary Convention of American Republics concluded at Washington, October 14, 1905, provides that the governments signatory thereto shall give immediate notification of the occurrence of plague, cholera, or yellow fever to the governments of the other nations whenever cases of any of these diseases occur within their respective territories. Subsequent reports of the course of the outbreak are also to be made similar to those provided for by the Paris convention. The terms of the Washington convention are much the same as those of the Paris convention and will be found on page 430.

Thus, it is seen that a knowledge of the occurrence and prevalence of disease is essential in all public health work, be it city or town, state or national; that in this country the local health officer depends necessarily upon the reports of cases of sickness made by the practicing physician; that the state depends upon the reports furnished by the local authorities; and that the nation depends upon the reports furnished by the states;

and further, that other countries look to our federal government to supply them with needed information.

A complete system for the notification of the preventable diseases would make available current information of the prevalence of these diseases throughout the country. It would show the localities in which they were most common, and in which, therefore, the factors and conditions necessary in causing them existed to the greatest extent. Of the epidemic diseases it would show the occurrence, spread and recession of outbreaks.

THE DISEASES THAT SHOULD BE NOTIFIABLE.

The question arises as to which diseases should be notifiable. It may be safely stated that all diseases should be notifiable of which the notification would be to the sanitary advantage of the community. This would include all preventable diseases and possibly also all diseases the causes or means of spread of which are unknown. The preventable diseases should be notifiable for the occurrence of cases would show the existence of the factors necessary in their causation; if infectious, the location of foci of infection; if not infectious, the existence of factors producing morbidity.

The diseases of which the causes or means of spread are unknown should be reported, as a knowledge of the prevalence and geographic distribution of such diseases and of the conditions under which they occur has proved to be one of the most useful aids in discovering the cause or means of spread.

THE ACTION TO BE TAKEN UPON NOTIFICATION OF CASES.

The paramount reason for the notification of sickness is that the health authority having jurisdiction may be cognizant of the occurrence of cases, and, therefore, able to inaugurate such measures and precautions as are possible for the protection of the other members of the community from exposure to the disease or from being affected by the same morbid influence. The notification of a case of scarlet fever enables the health officer to protect others from infection from the case notified; the reporting of several cases in persons having a common milk supply may reveal a focus of milk infection and make possible its elimination as a source of further injury; the notification of a case of plague makes possible the more intelligent search for foci of rat infection in a given locality; the reporting of a case of an occupational disease or injury shows the existence of the conditions essential to the production of such disease or injury and indicates the need for remedial measures.

However, unless the health department makes use of the information derived from these notifications in promoting the sanitary welfare of the community, the main object of the notifications remains unaccomplished.

Under these conditions it will be found that the practicing physician will often become negligent in making the required reports. A health department that does not make use of notifications cannot expect the sincere coöperation of the practicing physician, nor can such a department be said to be fulfilling all the functions properly belonging to a health office.

THE PHYSICIAN'S RELATION TO MORBIDITY REPORTS AND HEALTH ADMINISTRATION.

The primary factor in the securing of morbidity reports is the physician who comes into contact with cases of sickness. Upon him rests the responsibility of notifying the proper authorities of the occurrence of certain diseases. The practicing physician therefore is of fundamental importance in any scheme of public health administration. He is the sanitary outpost who informs the health department of the occurrence of disease and it is only through his reports of cases, and the information derived therefrom, that the health officer can inaugurate proper measures for the protection of the community. No state, city or town can hope to know of the existing prevalence of disease or the condition of the community's health in the absence of such notification.

Physicians have at times appeared to hold lightly their responsibilities in reporting cases of disease required by law to be notified. This has been so undoubtedly because of a lack of appreciation of the importance of and necessities for such notification. Any physician who does not comply with the requirements for the reporting of sickness is not only not a good citizen, but from an ethical standpoint stands convicted of not being interested in the community's welfare and the prevention of disease, inasmuch as he neglects to do his part, which is an essential one. With the great interest that has been shown, especially during the last few years, by the medical profession generally throughout the United States in public health work, the criticism of lack of coöperation on the part of the practicing physician should be an unusual one in this country.

The right of a state to require by law or regulation the notification of cases of sickness by physicians need not be considered. The point has been repeatedly established by the courts. The state in issuing licenses to certain persons permitting them to practice medicine is presumably attempting to eliminate those who are incapable or irresponsible, and by this means to guard the welfare of the community. There are, however, few things that a practitioner could be guilty of that are fraught with so much potential harm or possess so great possibilities for injury to the public welfare as the failure to report cases of the communicable diseases. An unreported case may, because of the absence of proper control, be the cause of secondary cases that might otherwise have been prevented, and it is a rather nice point of ethics as to whether the physician who neglects to report the primary case is not in some degree responsible for the secondary cases and for any fatalities that may occur among them. It would seem that a physician who violates the law in this way is not a proper person to hold a state license. This attitude has been taken by the legislature of Utah and in that state the statutes specify that whenever any licensed practitioner of medicine is guilty of wilful violation of the law in regard to the reporting of infectious diseases his license shall be revoked. There might be some advantage in a state's granting such a license only after a satisfactory examination of the applicant, not only upon the usual medical subjects, but also upon the state health laws and regulations. The applicant might further be required to certify that he had familiarized himself with these laws and regulations and that he agreed, at all times, faithfully to live up to their requirements. Such a plan would at least be a guarantee that those thus licensed were acquainted with the duties imposed upon them by law.

Or the plan might be carried further and the real status of the physician brought out still more clearly. Practicing physicians have an essential part in every effective plan for health administration. As previously referred to, they constitute the picket line or intelligence department. This relationship to the community might be officially recognized by making every practitioner licensed by the state, a member of a state sanitary reserve corps, subject to active duty under the state department of health whenever his services were needed for the common welfare. When he received his license he might at the same time receive an appointment issued by the state executive making him a member of the sanitary reserve corps and be required to take an appropriate oath of office.

Such an arrangement would undoubtedly be welcomed by the thousands of physicians who have become advocates for more extensive public health work.

ADDENDA.

RESOLUTION ADOPTED AT THE TENTH ANNUAL CONFERENCE OF STATE AND TERRITORIAL HEALTH OFFICERS WITH THE UNITED STATES PUBLIC HEALTH SERVICE REGARDING STATE MORBIDITY REPORTS.

The tenth annual conference of State and Territorial Health Officers with the Public Health Service in session June 1, 1912, adopted a resolution regarding state morbidity reports. The resolution was presented by the conference committee on morbidity reports of which the members were Dr. Mark W. Richardson, secretary and executive officer, Massachusetts State Board of Health; Dr. Ennion G. Williams, Health Commissioner of Virginia; Dr. S. J. Crumbine, secretary and executive officer, Kansas State Board of Health; Dr. William F. Snow, secretary and executive officer, California State Board of Health; and Dr. R. L. Dixon, secretary and executive officer, Michigan State Board of Health.

The following is a copy of the resolution as adopted:

STATE MORBIDITY REPORTS.

In order to make available to the health authorities of the States, Territories, and insular possessions of the United States, for their use and guidance in the protection of their respective communities, information regarding the prevalence and geographic distribution of certain diseases, and the occurrence of outbreaks and epidemics, be it resolved:

1. That the health authorities of the States, Territories, and insular possessions of the United States, including the District of Columbia, shall notify the Surgeon General of the Public Health and Marine-Hospital Service immediately by telegraph (collect) and letter upon the occurrence of a case or cases of cholera, yellow fever, typhus fever, plague, or Rocky Mountain spotted or tick fever, giving the number and location of cases, and that said authorities shall render monthly reports of the number of cases notified of smallpox, leprosy, scarlet fever, measles, diphtheria, typhoid fever, poliomyelitis, cerebrospinal meningitis, dysentery, Rocky Mountain spotted or tick fever, and other diseases notifiable in their respective jurisdictions; said monthly reports to be made on or before the 20th day of each month for the preceding calendar month, and to give the distribution of cases of smallpox, leprosy, poliomyelitis, cerebrospinal meningitis, Rocky Mountain spotted or tick fever, and typhoid fever, by counties, or by counties and cities, or by towns (townships), or by towns (townships) and cities; and that when in a State one or more cities are excepted by statute, charter, or otherwise from reporting the occurrence of the notifiable diseases to the State department of health, and the State report therefore is exclusive of cases occurring in such cities, the cities thus excluded shall be enumerated.

2. That upon the occurrence of an unusual outbreak, or in the event of a sudden increase in the number of cases of smallpox, scarlet fever, diphtheria, typhoid fever, poliomyelitis, cerebrospinal meningitis, or Rocky Mountain spotted or tick fever in any locality, the Surgeon General of the Public Health and Marine-Hospital Service shall be immediately notified by telegraph (collect) and letter of such unusual outbreak or sudden increase.

3. That in the primary notification of smallpox to local health authorities the date when the patient was last vaccinated and whether the disease is of the benign or virulent type shall be stated; that in all outbreaks of smallpox in which one or more deaths occur a report of such data as can be obtained regarding the origin of the first case or cases and the history of the outbreak shall be made to the Surgeon General after the subsidence of said outbreak; that all reports of cases of smallpox made by the State or other health authorities to the Surgeon General shall be divided into four classes:

(*a*) Those vaccinated within a period of seven years preceding the attack.
(*b*) Those whose last vaccination occurred more than seven years antedating the attack.
(*c*) Those who have never been successfully vaccinated.
(*d*) Those in which no definite history is to be obtained.

4. That in reporting the occurrence of cases of leprosy such data as it is possible to obtain regarding the patient's history shall be given.

5 That the Surgeon General shall, under the direction of the Secretary of the Treasury, pursuant to section 4 of an act approved February 15, 1893, entitled "An act granting additional quarantine powers and imposing additional duties upon the Marine-Hospital Service," compile and publish the reports forwarded in compliance with the foregoing in the Public Health Reports for the information of the health authorities of the several States, Territories, and insular possessions, including the District of Columbia .

INTERNATIONAL SANITARY CONVENTION OF PARIS, 1903.

CHAPTER 1.

PROVISIONS TO BE OBSERVED BY THE COUNTRIES SIGNING THE CONVENTION ON THE APPEARANCE OF PLAGUE OR CHOLERA IN THEIR TERRITORY.

SECTION 1. Notification and subsequent communications to the other countries.

ARTICLE 1. Every government must immediately notify to the other governments the first appearance of recognized cases of plague or cholera in its territory.

ART. 2. Such notification shall be accompanied or very promptly followed by detailed information as to:

(1) where the disease has appeared;

(2) the date of its appearance, its source and its type;

(3) the number of known cases and deaths;

(4) in the case of plague, the presence of that disease or of unusual mortality among rats or mice;

(5) the measures taken immediately on the first appearance of the disease.

ART. 3. The notification and the information prescribed in Articles 1 and 2 shall be supplied to the diplomatic or consular agencies in the capital of the infected country. In the case of countries not represented there, the notification and the information shall be telegraphed direct to the governments of these countries.

ART. 4. The notification and the information prescribed in Articles 1 and 2 shall be forwarded by subsequent communications furnished regularly and in such fashion as to keep the governments informed of the course of the epidemic. These communications shall be made at least once a week, shall be as complete as possible, and shall, in particular, indicate the precautions adopted with a view to prevent spread of the disease. They must set out with precision:

(1) the preventive measures taken in the way of sanitary inspection or of medical investigation, of isolation, and of disinfection;

(2) the measures adopted in the case of outgoing vessels to prevent exportation of the disease, and, particularly, in the case comtemplated in Art. 2 (4), the measures taken against rats.

ART. 5. It is of primary importance that the foregoing provisions be promptly and scrupulously complied with. Notification is of no real value unless every government be itself informed, in time, of cases of plague and cholera and also of doubtful cases occurring in its territory. It cannot therefore be too strongly impressed on the several governments that they should make notification of plague and cholera compulsory, and that they should keep themselves informed as to any unusual mortality among rats or mice, particularly in ports.

ART. 6. It is to be understood that neighboring countries reserve to themselves the right to make special arrangements with the object of organizing direct exchange of information between the principal administrative officers on their frontiers.

* * * * *

The governments signatory to the Paris convention were: United States, Germany, Austria-Hungary, Belgium, Brazil, Spain, France, Great Britain, Greece, Italy, Luxemburg, Montenegro, Netherlands, Persia, Portugal, Roumania, Russia, Servia, Switzerland, Egypt.

Those who later became adherents to the convention are: Mexico and Norway.

INTERNATIONAL SANITARY CONVENTION OF WASHINGTON, 1905.

CHAPTER 1.

REGULATIONS TO BE OBSERVED BY THE POWERS SIGNATORY TO THE CONVENTION AS SOON AS PLAGUE, CHOLERA, OR YELLOW FEVER MAY APPEAR IN THEIR TERRITORY.

SECTION 1. Notification and subsequent communications to other countries.

ARTICLE I. Each government should immediately notify other governments of the first appearance in its territory of authentic cases of plague, cholera, or yellow fever.

ART. II. This notification is to be accompanied, or very promptly followed, by the following additional information:

1. The neighborhood where the disease has appeared.
2. The date of its appearance, its origin, and its form.
3. The number of established cases and the number of deaths.
4. For plague—the existence among rats or mice of plague, or of an unusual mortality, for yellow fever—the existence of stegomyia fasciata in the locality.
5. The measures taken immediately after the first appearance.

ART. III. The notification and the information prescribed in Articles I and II are to be addressed to diplomatic and consular agents in the capital of the infected country; but this is to be construed as not preventing direct communication between officials charged with the public health of the several countries.

For countries which are not thus represented, they are to be transmitted directly by telegraph to the governments of such countries.

ART. IV. The notification and the information prescribed in Articles I and II are to be followed by further communications dispatched in a regular manner in order to keep the governments informed of the progress of the epidemic.

These communications, which are to be made at least once a week, and which are to be as complete as possible, should indicate in detail the precautions taken to prevent the extension of the disease.

They should set forth, first, the prophylactic measures taken relative to sanitary or medical inspection, to isolation, and disinfection; second, the measures taken relative to departing vessels to prevent the exportation of the disease, and, especially under the circumstances mentioned in paragraph 4 of Article II of this section, the measures taken against rats and mosquitoes.

ART. V. The prompt and faithful execution of the preceding provisions is of the very first importance.

The notifications only have a real value if each government is warned in time of cases of plague, cholera, or yellow fever and of suspicious cases of those diseases supervening in its territory. It can not, then, be too strongly recommended to the various governments to make obligatory the declaration of cases of plague, cholera, or yellow fever, and of giving information of all unusual mortality of rats and mice, especially in ports.

ART. VI. It is understood that neighboring countries reserve to themselves the right to make special arrangements with a view to organizing a service of direct information between the chiefs of administration upon the frontiers.

* * * * *

The governments signatory to the Washington convention were: United States, Chile, Costa Rica, Cuba, Dominican Republic, Ecuador, Guatemala, Mexico, Nicaragua, Peru, Venezuela.

Those who later became adherents to the convention are: Brazil, Colombia, Honduras, Salvador.

MISLEADING MORTALITY STATISTICS ON TUBERCULOSIS.

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Assistant Secretary National Association for the Study and Prevention of Tuberculosis, New York.

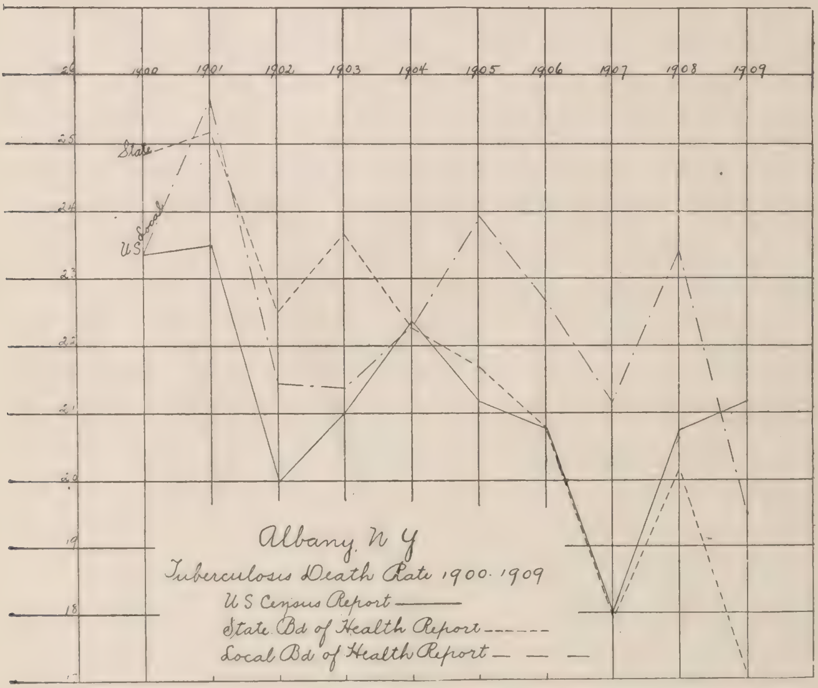
Read before the National Association for the Study and Prevention of Tuberculosis, Washington, D. C., May, 1912.

That accurate vital statistics are absolutely necessary to any movement for the betterment of health is simply repeating a truism to which the experience of every anti-tuberculosis worker will bear ample testimony. And to follow this self-evident assertion with a statement to the effect that accurate statistics of the number of deaths from tuberculosis are of fundamental importance in the campaign for the prevention of this disease would be simply stating in general terms the convictions of all who labor in this movement.

But vital statistics, of whatever their nature, whether of deaths, births, marriages, or of living cases of disease, are of little value; indeed, they are pernicious, if they are inaccurate. If there is any one place where accuracy is of prime importance it is in the science of statistics. Without accuracy in this department of public health work it is impossible either to secure an adequate idea of the extent and spread of a disease like tuberculosis, or to measure the amount of progress being made in combating it. How frequently, for example, are we called upon to compare the death rate of one city or group of cities with that of another city or group of cities! Every day the anti-tuberculosis and public heath worker has occasion to refer to the number of deaths from tuberculosis in his city or state, and he is constantly asked to compare the rate in his city with that in other cities, European or American. What shall we say, then, if, on careful investigation, we discover there are apparently numerous inaccuracies in the published mortality statistics of many of our American cities and that some of them are of such a nature as to make the reports of these cities of little or no value whatever?

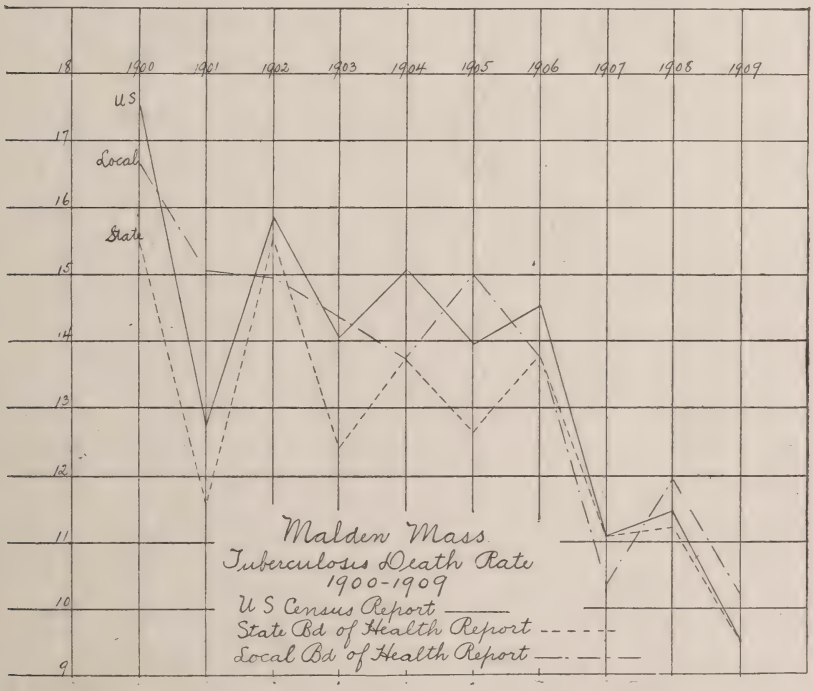
While attempting to compare the death rates from tuberculosis of some of our American cities two years ago, I discovered, much to my surprise, that there were considerable differences between the number of deaths from this disease in certain cities as reported by the local health authorities and by the United States Bureau of the Census. In some cases I found that the differences were so marked as to vitiate absolutely any of the reported death rates for comparative purposes. This led me to look into this matter more carefully, with the result that now, after over two years of study, I feel that, before using the published mortality figures of many of our American cities, great care should be taken to ascertain their accuracy. It is my purpose to show in this paper some of the most striking inaccuracies or differences discovered in this study, and to indicate in a general way some of the possible reasons for these variations. My paper will not be an attempt to explain these differences in detail, but it will be rather an effort to show that such differences do exist.

In order that I might not be accused of selecting certain cities in unfavorable portions of the country to prove a point, I have chosen the cities having a population of 30,000 and over in the states of New York, Massachusetts, Connecticut, New Jersey, Rhode Island, and Maryland. These states, as you will note, are among the oldest registration states in the country, and presumably have the best registration cities. The figures used, moreover, were for the decade 1900 to 1909, thus avoiding the danger of going too far back for data. The figures reported in this paper will be for a group of thirteen cities in Massachusetts and ten cities in New York. The methods in which the data for the investigation were secured will be presented first; a few illustrations of the differences in death



rates next; and, finally, a presentation of the possible reasons for variation.

For the purpose of securing the data for this study, separate and independent blanks were sent to each of the city health boards, and also to the state health board in each state. They were asked to report the total number of deaths from tuberculosis (all forms) for the decade 1900 to 1909 by years. In each case, whether state or local, the figures given were verified by the printed reports where there were any. In addition to these figures, similar data were obtained through the annual reports on mortality statistics, published by the Bureau of the Census only since 1900. All of these data, including the number of deaths for all causes and the number of deaths from tuberculosis, were transferred to cards, the reports from the three sources, United States Census, State Health Board, and Local Health Boards, being arranged side by side for each year. The discrepancies and differences between the three sources of reporting were at once apparent.

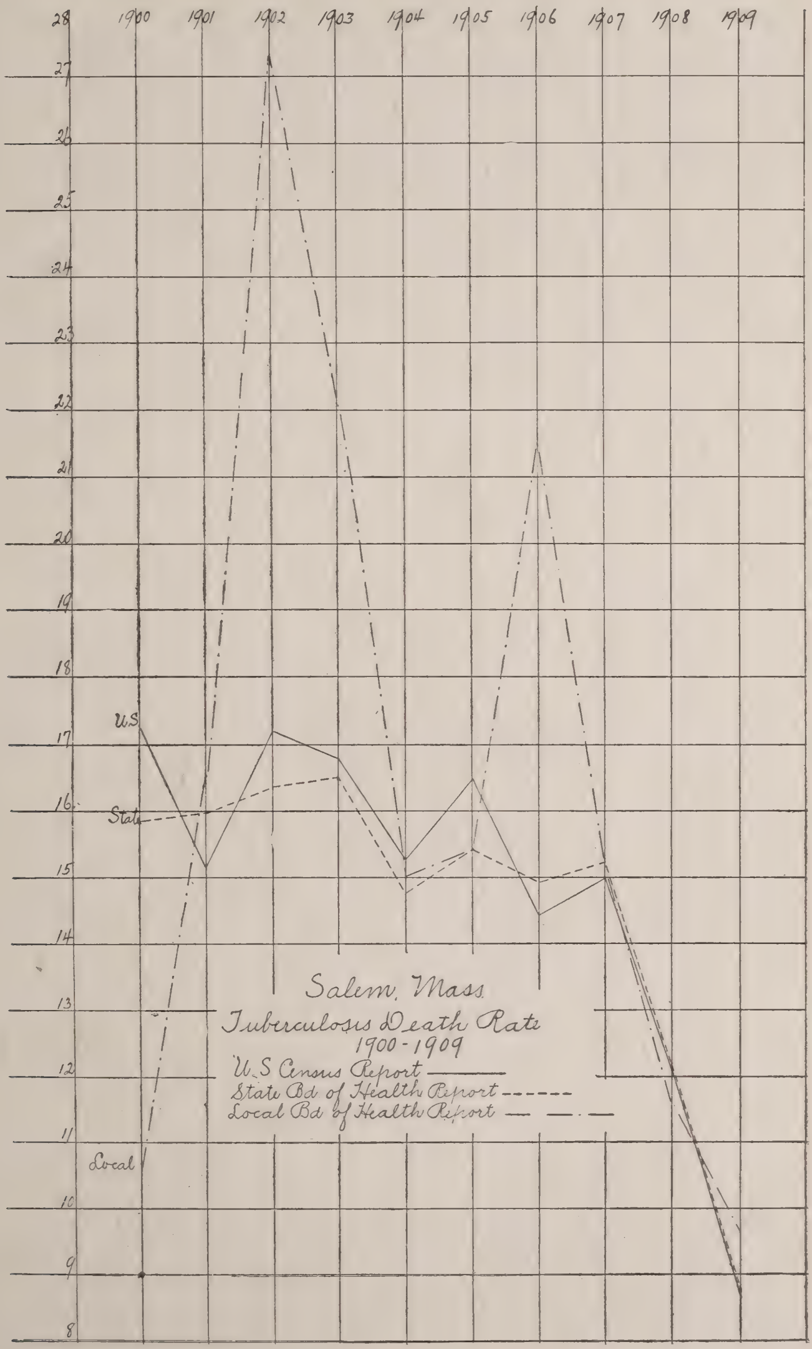


When, however, the death rates were computed from each source, the differences were much more marked. (The United States census population figures and the arithmetical method of determining the increase in population, used by the Bureau of the Census, were adopted in computing death rates, corrections being made wherever a population could be obtained in 1905 from a state census.) These death rates have been plotted for each source for the cities in Massachusetts and New York, and they give some interesting proofs of the misleading character of many of our published mortality figures.

It is significant that in not one of the forty cities for which data have been secured are the figures given by any two of the three sources reporting identical for three consecutive years. The degree of variation is not the same, for in some cases the differences are very slight and superficial, but in others they are so great that it is impossible for any one to determine from them what the true death rate in such cities in certain years should be without having recourse to the original death certificates. Furthermore, the differences are not constant as to any single source, even in a given city. In one or two instances, as in Boston, for example, the relation of the three sources remains fairly constant. In most of the cities, however, the mortality curves from the three sources for the ten-year period cross each other in almost every conceivable manner. In a given year in a certain city, as in Albany in 1904, the rates from the three sources will be practically identical, while in the very next year the difference will be marked—in this case 21.16 per 10,000 population for the census, 21.67 for the state, and 23.92 for the local authorities. In 1909 the census rate in this same city was 21.15, the state 17.04, and the local 19.44. In Cambridge, Mass., to cite another instance, the rates from the three sources were very nearly the same in 1904, but after that year the local rate declines very rapidly, while the state and census rates go up with even greater rapidity until, in 1909, the census rate is 27.10, the state 27.38, while the local is only 15.48. The accompanying tables and diagrams will illustrate these points.

If we call the average death rate of the three sources in each year 100 and take the ratios of each of the rates from the various sources in each year to this average, we may see more clearly, perhaps, how serious a matter some of the differences are. In the city of Binghamton, N. Y., for instance, deviations from the average range all the way from 31.2, or nearly 70 below the average, according to the state figures, to 140.6 in the same year, according to the Census figures. Or take Fall River, Mass., where the deviations from the average range from 88.5 in 1903 according to the census figures to 121.9, according to local figures.

As to the reasons for these apparent differences between the published death rates from the various sources, I am unable to state with any degree of exactness. We may, however, at the present time be able to suggest some possible causes for the wide range of differences, without attempting to explain in detail the variations in any particular city.


Salem, Mass.
Tuberculosis Death Rate
1900-1909
U.S Census Report ———
State Bd of Health Report ------
Local Bd of Health Report — — —·—
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U.S
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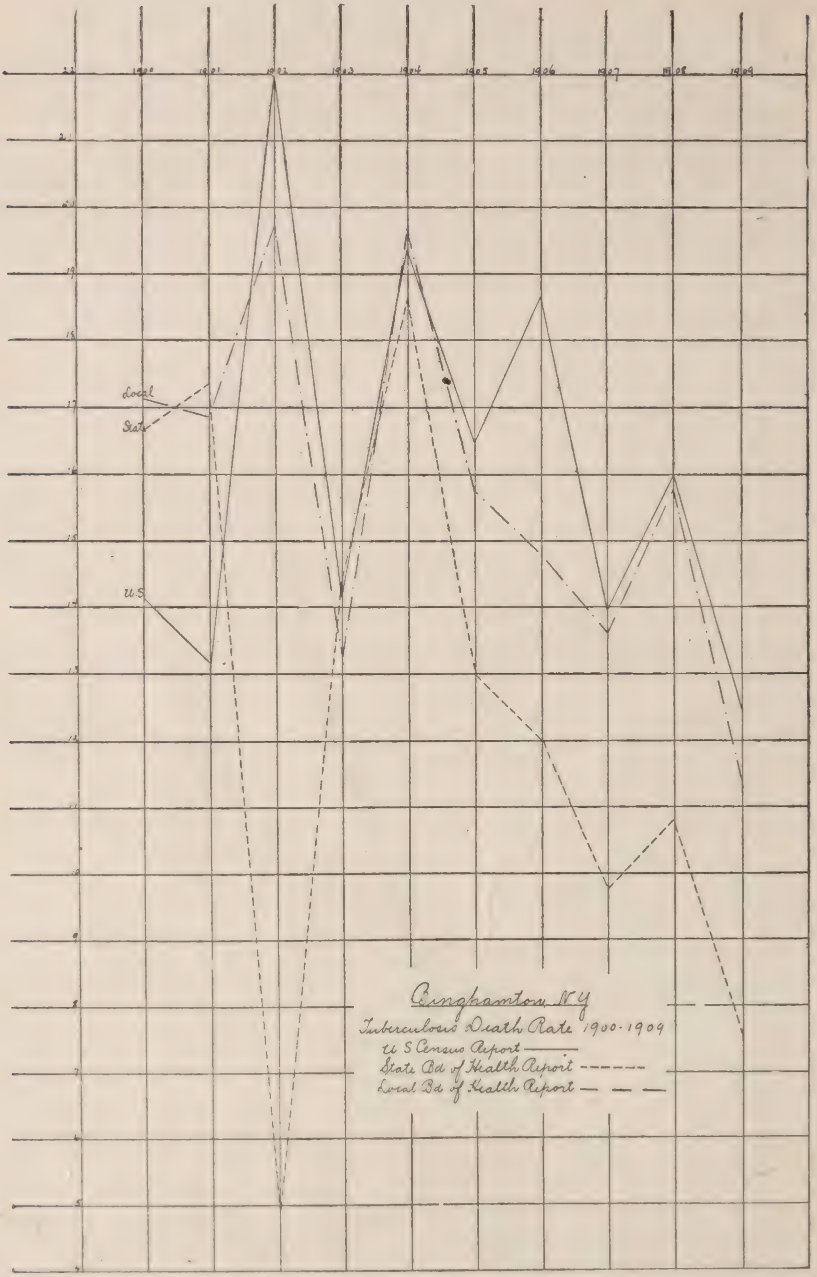
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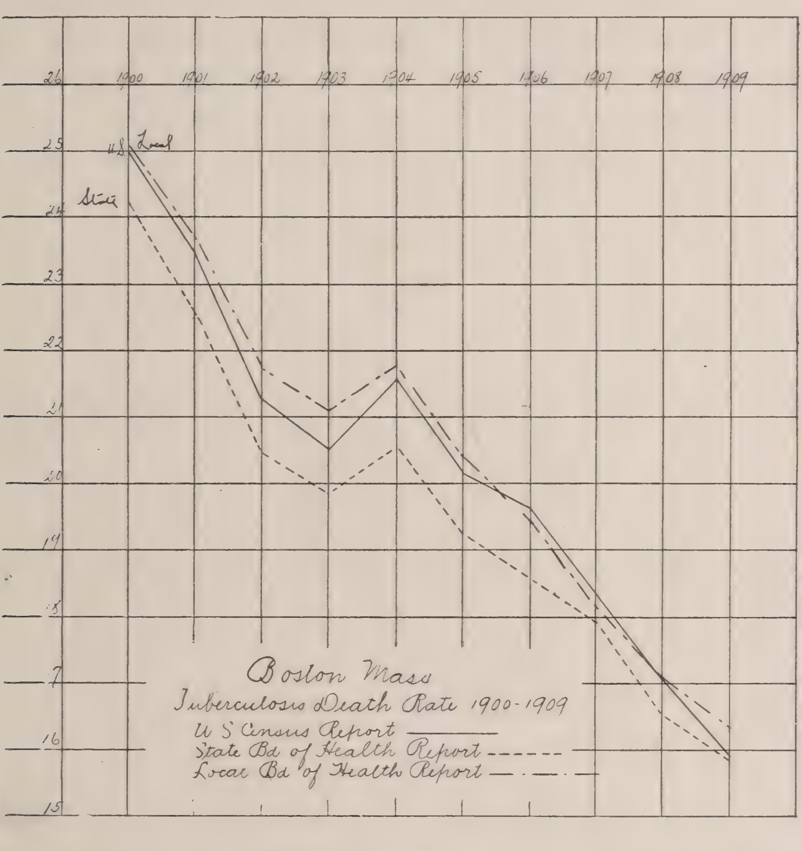
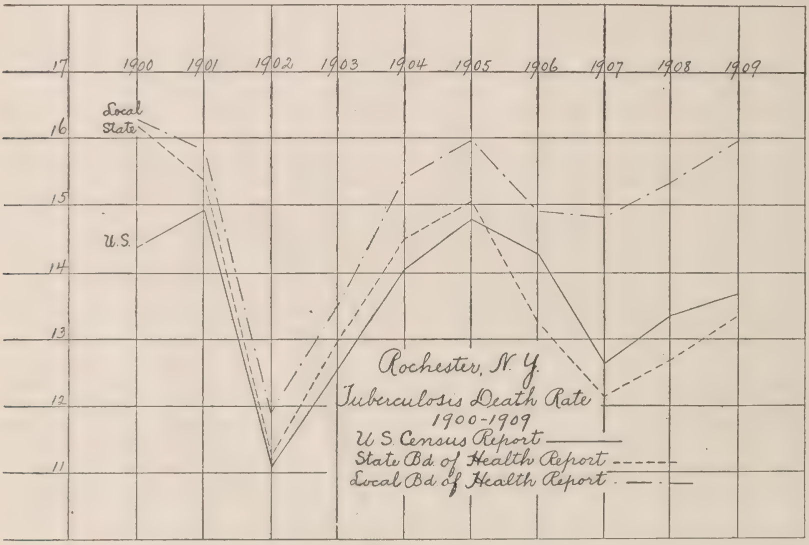
U.S.
Binghamton N Y
Tuberculosis Death Rate 1900-1909
U S Census Report ———
State Bd of Health Report - - - - - -
Local Bd of Health Report — — —

Probably one of the most obvious reasons for differences in reported figures may be grouped under the heading of typographical errors. This cause would seem to account for a number of the minor differences in figures, and in one case at least to one figure of considerable importance. I refer to the death rate in Binghamton, N. Y., for 1902, which is 4.87 according to the state figures. The number of deaths upon which this figure as given in the yearly report of causes of death is based is evidently a typographical error, as it does not compare with the sum of the deaths by causes as given in Binghamton according to the monthly reports for 1902 (see pp. 759 and 796, N. Y. S. D. of H. Report, 1902). It is highly probable that in cases where so many tables are involved some errors of a purely clerical or typographical nature will creep in.



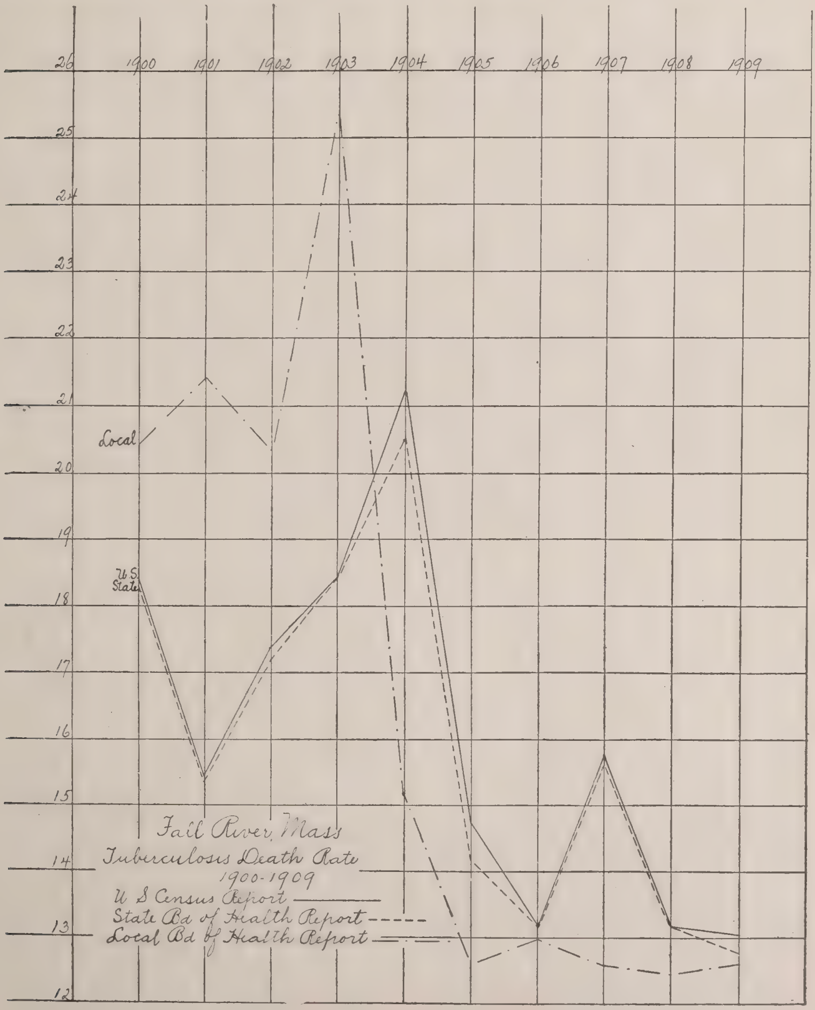
A second obvious group of causes relates to the methods of classification of the causes of death. The Manual of the International List of Causes of Death, published by the Bureau of the Census (pp. 58–61), contains a list of over two hundred possible designations of diseases which may be included under some form of tuberculosis. The detailed international list of causes gives eight different causes under tuberculosis, namely, tuberculosis of the lungs; acute miliary tuberculosis; tuberculous meningitis; abdominal tuberculosis; Pott's disease; white swellings; tuberculosis of other organs; and disseminated tuberculosis. The abridged international list of causes of death condenses these eight causes under three heads, namely, tuberculosis of the lungs; tuberculous meningitis, and other forms of tuberculosis. This is by far the most common form used in general practice by local health boards, where any attempts to adopt the international classification has been made.



When one takes into consideration the numerous personal factors which enter into the filing of death certificates, it is not remarkable that there should be a wide range in the classification of causes of death, and that some certificates may be grouped under three or more different heads according to the number of agencies engaged in the compilation of statistics from them. Thus, for instance, in a pamphlet issued for local registrars by the Bureau of the Census, entitled "Practical Registration Methods," a few of the more common indefinite terms frequently used by physicians in stating causes of death are given (p. 17 *et seq.*). A few concrete examples will show at a glance how much must be left to the discretion and judgment of the agency compiling the statistics.

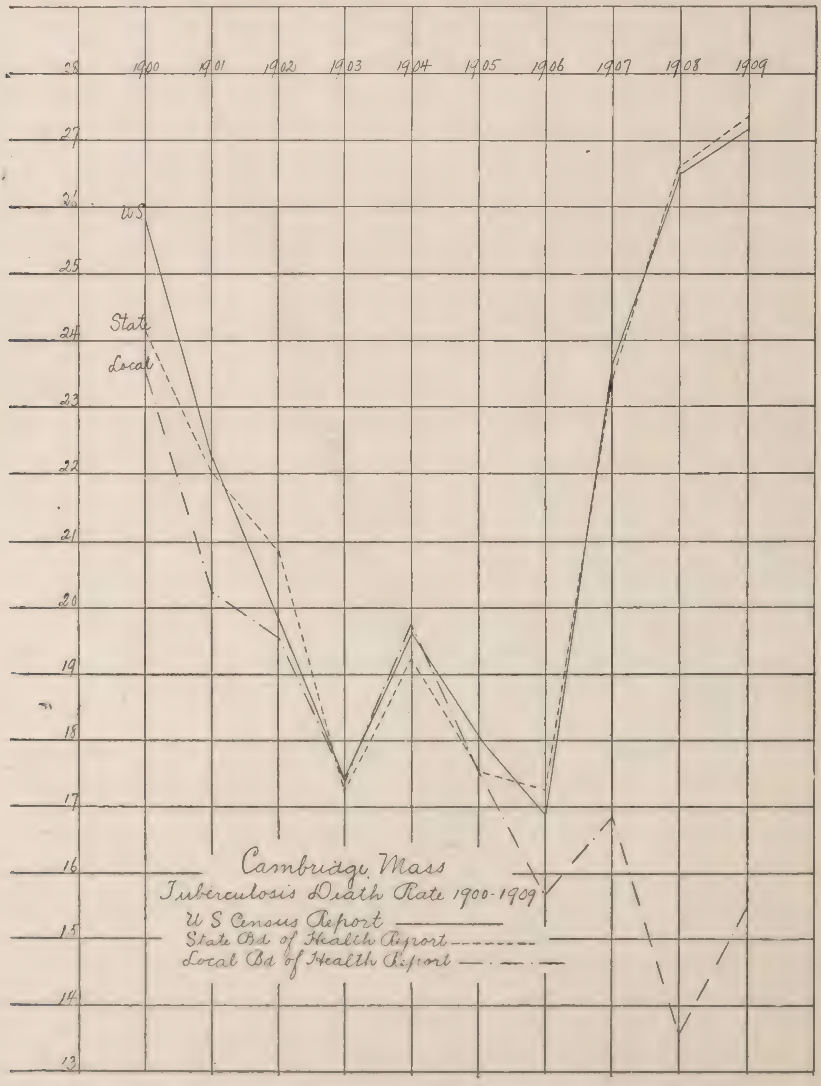
"Bad cold," for example, may be bronchitis, pneumonia, or, more probably, pulmonary tuberculosis. The term "chronic bronchitis," the Census Bureau states, "frequently disguises pulmonary tuberculosis." "Chronic pneumonia" is used in a similar manner. Such terms as "filling up of lungs," "gradual decay," "hemoptysis," "hemorrhage of lungs," "lung trouble," "scrofula," "menigitis," or "spinal trouble" are frequently used, either intentionally to deceive or through lack of sufficient information, when tuberculosis in some form is meant.

If a local registrar once accepts such a faulty certificate, very little can be done either by the State Board of Health or the Bureau of the Census to secure the additional information needed, in order that the true cause of death may be properly tabulated. Some efforts are being made by the Bureau of the Census to correct these errors, but the lack of funds to carry on the detailed correspondence necessary usually prohibits such action on a large scale. The obvious responsibility lies with the local registrar, who should not accept a faulty certificate, and who should withhold

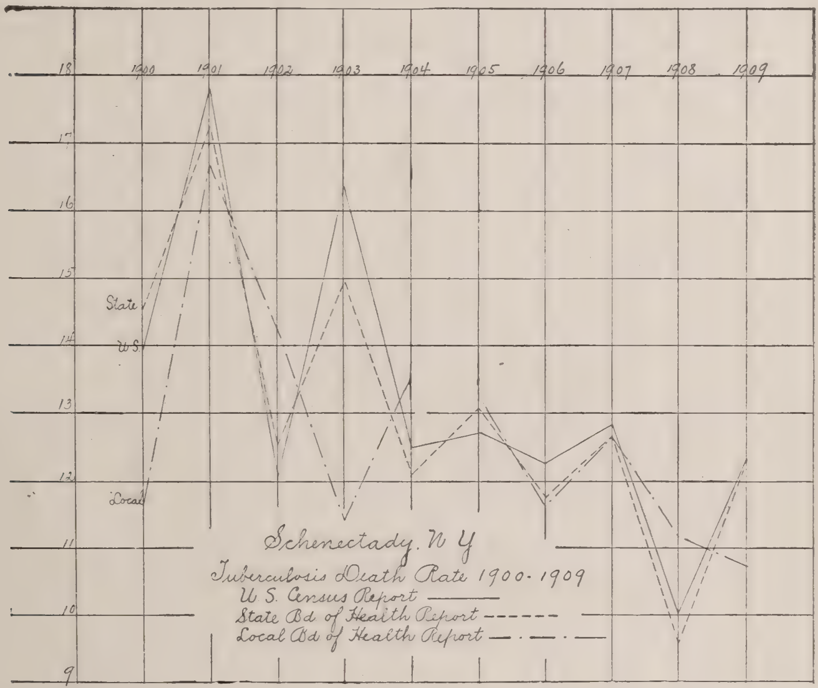


the burial permit until the proper information is filed. He alone can compel the local physician to state his causes of death accurately.

A third reason for many of the serious differences occurring between the published death rates of certain cities from the three sources we have mentioned lies in the exclusion or inclusion, as the case may be, of non-residents. The proper method, as adopted by the Bureau of the Census, is to include in the general tables all deaths in the city or district in which they occur. If it is desired to eliminate them, this may be done in special tables or columns or by footnotes. While I have not attempted to study the various figures with a view to determining where this cause would apply, from general knowledge of local conditions and other information at hand I can

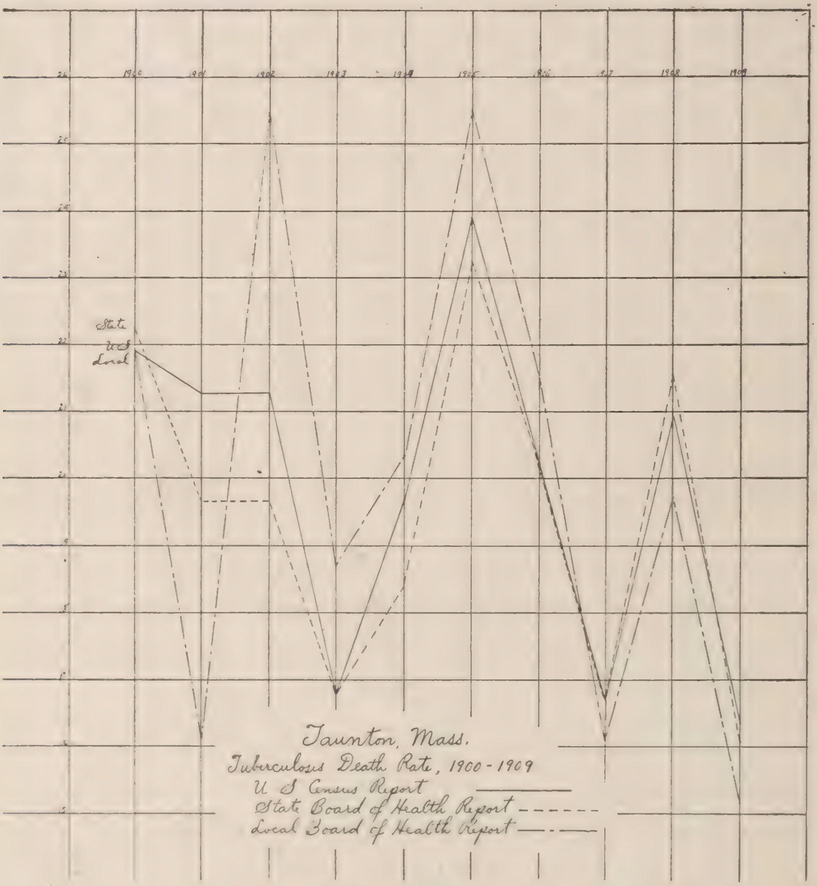


readily see where the death rates in many cities would be seriously affected. For instance, the local figures for Cambridge for the last three years of the decade exclude a considerable number of non-residents, which, had they been included, would have altered the death rate materially. The local health officer, however, while he mentions the number of deaths from tuberculosis of non-residents in his detailed classification of causes of death, in a table showing comparative death rates for different years and different diseases (p. 11, 1909–10), excludes these deaths without any mention of the fact. It is undoubtedly true also, from the *prima facie* evidence in Binghamton, Albany, or Rochester, for example, that the deaths of non-residents have been included in some years in one or more of the three sources reporting, and that they have been excluded in other years and by other sources. In a city where there is a large state institution or where there are a number of general hospitals, this cause of difference may be very prominent.



Still another obvious reason for differences in the three sources of mortality statistics lies in the varying dates of ending of the fiscal years. The census figures are for the calendar year, and in most cases the state figures are for a similar period. The local years vary, however, considerably. In some cities they coincide with the calendar year and in others they may begin on October 1, March 1, or May 1, in accordance with certain fixed customs or ordinances. This will affect mortality statistics considerably, though not so much as some of the other reasons mentioned.

These are only a few of the obvious reasons for the discrepancies we have mentioned. It is equally obvious that uniformity is desirable above everything else in the reporting, registering, and classifying of mortality data, particularly with reference to tuberculosis. The Bureau of the Census, with its limited power and appropriation, is doing everything it can to secure uniformity. Its own mortality statistics are all compiled after uniform methods, and they are, therefore, the most reliable of any published in this country, especially for comparative purposes. Much needs to be done in the way of correcting faulty reports from physicians and faulty records by local and state registrars, and this, too, the Census Bureau and the various state boards of health are undertaking. The permanent Bureau of the Census was established in 1900, and the first manual of the causes of death was issued in 1902. Consequently, the effort to secure uniformity is still in its incipiency.



It is hoped, however, that before the end of another decade mortality statistics in our American cities will be comparable, from whatever source they are taken.

The detailed tables from which the data for this report were taken follow:

DEATH-RATES FROM TUBERCULOSIS IN NINETEEN MASSACHUSETTS CITIES. COMPUTED FROM THREE SOURCES OF REPORTING: UNITED STATES BUREAU OF THE CENSUS, STATE BOARD OF HEALTH, AND LOCAL BOARDS OF HEALTH: 1900–1909 INCLUSIVE

City	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909
Boston:										
U. S.	24.98	23.44	21.23	20.51	21.58	20.16	19.64	18.37	17.03	15.92
State	24.21	22.56	20.46	19.86	20.56	19.23	18.57	17.93	16.51	15.84
Local	25.09	23.71	21.70	21.10	21.75	20.39	19.41	18.19	17.08	16.35
Brockton:										
U. S.	18.97	15.86	16.45	11.85	12.33	14.02	9.87	8.55	9.95	8.35
State	17.22	16.34	16.92	12.30	11.89	14.02	10.07	7.77	9.76	8.17
Local	19.47	17.06	17.61	14.32	14.92	16.74	11.08	9.91	9.57	8.17
Cambridge:										
U. S.	24.81	22.26	19.87	17.43	19.62	18.06	16.88	23.60	26.50	27.18
State	24.16	22.04	20.19	17.22	19.21	17.55	17.28	23.40	26.60	27.38
Local	22.53	20.22	19.55	17.43	19.73	17.55	15.66	16.83	13.54	15.48
Chelsea:										
U. S.	18.78	17.28	17.53	20.55	22.38	17.70	17.34	16.15	12.79	11.37
State	18.78	17.00	17.82	18.33	20.19	15.55	17.34	16.15	12.21	11.07
Local	19.96	17.28	18.95	18.89	20.74	16.09	18.72	16.15	13.95	12.86
Fall River:										
U. S.	18.41	15.42	17.39	18.41	21.22	14.75	13.18	15.74	13.17	13.03
State	18.31	15.33	17.20	18.50	20.55	14.18	13.18	15.65	13.17	12.78
Local	20.41	21.42	20.43	25.33	15.15	12.58	12.99	12.68	12.45	12.60
Fitchburg:										
U. S.	9.83	12.25	10.89	12.34	10.70	8.78	12.06	13.45	10.02	6.23
State	9.83	11.62	10.89	12.95	10.70	9.09	12.06	12.87	10.02	6.78
Local	10.15	11.94	10.89	12.03	11.00	8.78	11.77	12.87	9.46	6.51
Haverhill:										
U. S.	18.29	23.86	15.76	16.50	16.45	19.03	14.32	15.86	13.70	12.36
State	17.75	23.86	14.16	16.21	16.18	19.03	13.04	16.11	13.22	11.43
Local	17.75	19.84	13.89	14.59	15.92	17.71	14.07	16.11	13.22	12.59
Holyoke:										
U. S.	19.91	18.04	16.67	15.34	19.96	16.22	13.39	16.77	15.38	15.30
State	20.13	18.04	16.25	14.72	17.32	14.22	12.62	16.39	15.01	15.30
Local	19.25	18.90	16.46	14.32	21.19	15.92	11.12	16.96	15.01	14.06
Lawrence:										
U. S.	18.70	16.24	17.39	15.66	16.78	16.27	14.87	15.18	13.32	15.83
State	18.54	16.86	16.32	17.45	16.19	15.27	14.75	14.26	13.32	15.95
Local	18.22	17.16	17.20	17.60	17.07	16.84	14.61	15.44	15.83	18.61
Lowell:										
U. S.	19.27	16.64	16.43	13.59	14.12	15.39	15.43	15.46	12.18	12.01
State	19.06	16.85	16.22	13.06	13.28	15.60	14.71	15.46	12.28	12.11
Local	19.59	17.90	17.27	13.91	13.17	15.39	15.23	15.46	11.69	12.49
Lynn:										
U. S.	19.27	14.67	13.63	12.49	19.38	13.24	9.68	14.15	13.03	11.05
State	18.68	14.10	13.35	11.82	18.19	12.85	9.68	14.03	12.79	11.28
Local	18.83	16.38	14.32	12.09	17.92	13.50	9.93	13.90	13.03	11.16
Malden:										
U. S.	17.53	12.74	15.81	14.05	15.07	13.93	14.50	11.09	11.46	9.50
State	15.45	11.58	15.53	12.40	13.72	12.62	13.73	11.09	11.22	9.50
Local	16.64	15.06	14.97	14.33	13.72	14.99	13.73	10.35	11.94	10.20
New Bedford:										
U. S.	16.98	21.75	18.15	18.11	20.98	15.87	16.49	15.37	13.44	12.90
State	16.98	21.44	16.96	17.96	18.90	16.00	16.61	15.85	13.56	13.55
Local	16.18	21.44	17.26	16.81	19.03	16.41	15.73	15.97	14.13	13.44

DEATH-RATES FROM TUBERCULOSIS IN NINETEEN MASSACHUSETTS CITIES—(*Continued*)

CITY	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909
Newton:										
U. S.	10.42	10.52	9.17	7.04	10.50	8.42	6.41	7.36	7.76	6.63
State	11.31	12.56	8.31	6.47	9.67	8.15	6.68	7.10	8.02	6.63
Local	10.12	12.85	9.75	6.47	9.12	7.60	5.87	6.83	7.25	6.37
Salem:										
U. S.	17.24	15.16	17.20	16.78	15.28	16.48	14.41	14.97	12.05	8.70
State	15.85	15.98	16.38	16.51	14.75	15.41	14.93	15.22	12.05	8.70
Local	10.57	16.53	27.30	22.19	15.02	15.41	21.49	15.22	11.63	9.65
Somerville:										
U. S.	16.87	14.56	17.00	12.38	13.88	10.97	12.84	11.86	9.99	10.04
State	16.71	14.09	16.38	12.08	13.14	11.12	12.70	11.45	9.99	9.91
Local	16.55	14.56	15.92	12.38	13.88	12.13	13.40	11.86	9.61	10.17
Springfield:										
U. S.	15.95	16.63	13.95	14.36	14.18	11.97	11.74	11.54	9.42	10.94
State	16.44	16.47	13.65	14.07	13.05	11.69	12.13	11.16	9.08	10.83
Local	15.63	15.69	13.05	16.53	15.16	12.51	12.26	12.17	8.57	10.60
Taunton:										
U. S.	21.91	21.27	21.28	16.78	19.69	23.90	20.23	16.72	20.94	16.36
State	22.23	19.66	19.67	16.78	18.40	23.25	20.23	16.72	21.55	16.07
Local	21.91	16.12	25.48	18.71	20.34	25.51	21.50	16.10	19.73	15.17
Worcester:										
U. S.	20.60	19.19	16.52	17.06	16.80	17.17	15.48	15.00	15.05	11.86
State	20.77	18.69	15.78	16.58	15.77	16.62	15.33	14.26	14.76	11.86
Local	21.11	19.94	17.01	17.14	16.25	17.79	14.88	13.82	14.76	12.28

DEATH-RATES FROM TUBERCULOSIS IN TEN NEW YORK CITIES. COMPUTED FROM THREE SOURCES OF REPORTING: UNITED STATES BUREAU OF THE CENSUS, STATE BOARD OF HEALTH, AND LOCAL BOARDS OF HEALTH: 1900–1909 INCLUSIVE

CITY	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909
Albany:										
U. S.	23.37	23.50	19.98	20.97	22.35	21.16	20.75	17.99	20.70	21.15
State	24.53	25.18	22.50	23.66	22.25	21.67	20.65	17.91	21.15	17.04
Local	23.37	25.61	21.44	21.38	22.25	23.92	22.68	21.15	23.36	19.44
Auburn:										
U. S.	15.82	13.32	9.29	18.01	15.27	11.99	16.08	13.18	14.19	10.80
State	17.13	13.96	10.57	18.00	14.64	12.91	15.77	12.28	14.19	9.93
Local	17.46	14.94	10.57	17.37	16.51	11.68	15.77	13.18	13.90	10.80
Binghamton:										
U. S.	14.12	13.14	21.94	14.14	19.34	16.47	17.66	13.92	15.98	12.45
State	16.64	17.35	4.87	14.38	18.62	12.99	12.00	9.72	10.79	7.59
Local	17.15	16.85	19.74	13.18	19.57	15.77	14.79	12.60	15.76	11.39
Buffalo:										
U. S.	11.32	12.68	11.76	12.20	13.57	13.00	12.55	12.38	12.79	12.79
State	12.11	13.32	12.61	12.83	12.39	12.81	12.83	12.53	12.98	12.62
Local	12.00	13.18	12.45	12.83	13.81	12.81	12.83	12.56	13.08	12.62

DEATH-RATES FROM TUBERCULOSIS IN TEN NEW YORK CITIES—(*Continued*)

CITY	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909
Elmira:										
U. S.	12.90	12.05	14.57	11.20	12.04	13.72	13.32	13.22	9.29	10.30
State	14.29	14.29	15.40	10.64	11.20	14.27	13.05	12.67	9.01	9.21
Local	15.13	14.85	16.25	11.20	13.16	13.15	13.32	12.39	10.11	9.75
New York City:										
U. S.	24.20	22.88	20.78	21.16	22.04	21.11	21.49	20.68	19.77	18.67
State	23.74	22.93	20.72	21.64	21.90	21.31	21.60	20.88	19.87	18.73
Local	23.72	22.91	20.67	21.19	21.59	21.33	21.55	20.89	19.88	18.73
Rochester:										
U. S.	14.39	14.92	11.06	12.56	14.05	14.78	14.29	12.62	13.35	13.65
State	16.17	15.39	11.24	12.96	14.50	15.05	13.26	12.16	12.66	13.36
Local	16.29	15.81	11.88	13.48	15.40	15.98	14.90	14.81	15.31	15.97
Schenectady:										
U. S.	13.89	17.80	12.10	16.34	12.48	12.71	12.26	12.80	10.00	12.30
State	14.51	17.23	12.52	14.96	12.10	13.05	11.77	12.64	9.55	12.30
Local	11.67	16.67	14.22	11.41	13.55	13.22	11.61	12.64	11.19	10.72
Syracuse:										
U. S.	15.78	15.89	11.80	13.11	14.65	12.04	12.05	11.90	11.99	11.18
State	15.87	16.07	11.88	12.49	14.90	12.46	11.30	11.82	11.91	10.88
Local	15.59	16.52	11.17	12.93	14.73	13.31	11.88	11.50	11.84	11.03
Yonkers:										
U. S.	17.32	20.15	16.13	20.35	19.59	17.59	16.43	13.23	16.15	14.18
State	15.80	19.94	16.31	21.06	19.24	17.91	17.05	12.36	16.01	14.05
Local	16.47	18.17	17.44	21.96	18.73	16.25	16.28	12.79	16.56	14.58

DEATHS FROM TUBERCULOSIS IN NINETEEN MASSACHUSETTS CITIES. ARRANGED ACCORDING TO THREE SOURCES OF REPORTING: UNITED STATES BUREAU OF THE CENSUS, STATE BOARD OF HEALTH, AND LOCAL BOARDS OF HEALTH: 1900–1909 INCLUSIVE

CITY	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909
Boston:										
U. S.	1,400	1,331	1,220	1,193	1,270	1,200	1,199	1,149	1,091	1,044
State	1,358	1,281	1,176	1,155	1,210	1,145	1,134	1,122	1,058	1,039
Local	1,407	1,346	1,247	1,227	1,280	1,224	1,185	1,138	1,094	1,072
Brockton:										
U. S.	76	66	71	53	57	67	49	44	53	46
State	69	68	73	55	55	67	50	40	52	45
Local	78	71	76	64	69	80	55	51	51	45
Cambridge:										
U. S.	228	207	187	166	189	176	168	237	270	281
State	222	205	190	164	185	171	171	235	271	283
Local	207	188	184	166	190	171	156	169	138	160
Chelsea:										
U. S.	64	60	62	74	82	66	63	57	44	38
State	63	59	63	66	74	58	63	57	42	37
Local	68	60	67	68	76	60	68	57	48	43
Fall River:										
U. S.	193	162	183	194	224	156	147	175	150	152
State	192	161	182	195	217	150	147	174	150	149
Local	214	225	215	267	160	133	141	151	142	147

Deaths from Tuberculosis in Nineteen Massachusetts Cities—(*Continued*)

City	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909
Fitchburg:										
U. S.	31	39	35	40	35	29	41	47	36	23
State	31	37	35	42	35	30	41	45	36	25
Local	32	38	35	39	36	29	40	45	34	24
Haverhill:										
U. S.	68	89	59	62	62	72	56	64	57	53
State	66	89	53	61	61	72	51	65	55	49
Local	66	74	52	55	60	67	55	65	55	54
Holyoke:										
U. S.	91	84	79	74	98	81	69	89	84	86
State	92	84	77	71	85	71	67	87	82	86
Local	88	88	78	69	104	79	59	90	82	79
Lawrence:										
U. S.	117	104	114	105	115	114	109	116	106	131
State	116	108	107	117	111	107	108	109	106	132
Local	114	110	113	118	117	118	107	118	126	154
Lowell:										
U. S.	183	158	156	129	134	146	150	153	124	125
State	181	160	154	124	126	148	143	153	125	126
Local	186	170	164	132	125	146	148	153	119	130
Lynn:										
U. S.	132	103	98	92	146	102	77	116	110	96
State	128	99	96	87	137	99	77	115	108	98
Local	129	115	103	89	135	104	79	114	110	97
Malden:										
U. S.	59	44	56	51	56	53	57	45	48	41
State	52	40	55	45	51	48	54	45	47	41
Local	56	52	53	52	51	57	54	42	50	44
New Bedford:										
U. S.	106	141	122	126	151	118	130	128	118	119
State	106	139	114	125	136	119	131	132	119	125
Local	101	139	116	117	137	122	124	133	124	124
Newton:										
U. S.	35	36	32	25	38	31	24	28	30	26
State	38	43	29	23	35	30	25	27	31	26
Local	34	44	34	23	33	28	22	26	28	25
Salem:										
U. S.	62	55	63	62	57	62	56	60	50	37
State	57	58	60	61	55	58	58	61	50	37
Local	38	60	100	82	56	58	83	61	48	41
Somerville:										
U. S.	104	92	110	82	94	76	91	86	74	76
State	103	89	106	80	89	77	90	83	74	75
Local	102	92	103	82	94	84	95	86	71	77
Springfield:										
U. S.	99	107	93	99	101	88	90	92	77	94
State	102	106	91	97	93	86	93	89	76	93
Local	97	101	87	114	108	92	94	97	71	91
Taunton:										
U. S.	68	66	66	52	61	74	64	54	69	55
State	69	61	61	52	57	72	64	54	71	54
Local	68	50	79	58	63	79	68	52	65	51
Worcester:										
U. S.	244	231	202	212	212	220	204	203	209	169
State	246	225	193	206	199	213	202	193	205	169
Local	250	240	208	213	205	228	196	187	205	175

DEATHS FROM TUBERCULOSIS IN TEN NEW YORK CITIES, ARRANGED ACCORDING TO THREE SOURCES OF REPORTING: UNITED STATES BUREAU OF THE CENSUS, STATE BOARD OF HEALTH, AND LOCAL BOARDS OF HEALTH: 1900–1909 INCLUSIVE

City	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909
Albany:										
U. S.	220	223	191	202	217	207	204	178	207	168
State	231	239	215	228	216	212	203	177	210	170
Local	220	243	207	221	216	234	223	209	232	194
Auburn:										
U. S.	48	41	29	57	49	39	53	44	48	37
State	52	43	33	57	47	42	52	41	48	34
Local	53	46	33	55	53	38	52	44	47	37
Binghamton:										
U. S.	56	53	90	59	82	71	78	63	74	59
State	66	70	20	60	79	56	53	44	50	36
Local	68	68	81	55	83	68	66	57	73	54
Buffalo:										
U. S.	399	453	426	448	505	490	485	490	518	530
State	427	476	457	471	461	483	496	496	526	523
Local	423	471	451	471	514	483	496	497	530	523
Elmira:										
U. S.	46	43	52	40	43	49	48	48	34	38
State	51	51	55	38	40	51	47	46	33	34
Local	54	53	58	40	47	47	48	45	37	36
New York City:										
U. S.	8,316	8,121	7,610	7,990	8,570	8,445	8,927	8,909	8,819	8,616
State	8,162	8,141	7,589	7,990	8,516	8,528	8,976	8,996	8,867	8,645
Local	8,154	8,135	7,571	8,001	8,495	8,535	8,955	8,999	8,869	8,643
Rochester:										
U. S.	234	248	188	218	249	269	270	248	272	288
State	263	256	191	225	257	274	251	239	258	282
Local	265	263	202	234	273	291	282	291	312	337
Schenectady:										
U. S.	44	63	57	83	68	74	75	82	67	86
State	46	61	59	76	66	76	72	81	64	86
Local	37	59	67	58	74	77	71	81	75	75
Syracuse:										
U. S.	171	175	132	149	169	141	146	149	155	149
State	172	177	133	142	172	146	138	148	154	145
Local	169	182	125	147	170	156	144	144	153	147
Yonkers:										
U. S.	83	102	86	114	115	108	107	91	117	108
State	71	101	87	118	113	110	103	85	116	107
Local	79	92	93	123	110	106	113	88	120	111

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THE CONGRESS ON SCHOOL HYGIENE

The Fourth International Congress on School Hygiene is to be held at Buffalo, August 25–30, 1913. The bulletin announcing the objects and organization of this Congress indicates that it is being planned for the purpose (1) of bringing together men and women interested in the health of school children; (2) of organizing a program of papers and discussions covering the field of school hygiene; (3) of assembling a scientific exhibit representing the best that is being done in school hygiene; (4) of securing a commercial exhibit of practical and educational value to school people; and (5) of publishing the proceedings of the Congress and distributing them to each member. The Congress is under the honorary patronage of the President of the United States and under the presidency of Mr. Charles W. Eliot, one-time President of Harvard University. The list of organizing committees contains committees in thirty-four foreign countries and in forty-five states in this country. The program at the present time is made up of two hundred and thirty papers in addition to ten or a dozen symposiums which are being formed by as many national societies interested in various special phases of school hygiene.

The diverse geographical source of the various officers and committees listed in this bulletin indicate a pretty general realization of the universal need for improved sanitary and hygienic influences in our city, village and rural schools. The program indicates a definite desire on the part of the promoters of this Congress to focus attention upon the application of hygienic knowledge, hygienic methods and hygienic procedures to school conditions through school people and through public-spirited citizens, so that our scientific knowledge of school hygiene may be put to work for the benefit of mankind. This journal desires to express a cordial sympathy with these plans and to state the hope that this Congress may lead to a persistent, permanent and serious activity in the interest of better school conditions in all communities.

COLORADO SPRINGS MEETINGS, SEPTEMBER 9–13.

The 1913 meetings of the American Public Health Association are rapidly drawing near and good progress is being made in the preparation of the programs for the meetings of the general Association and of the five sections.

It has been demonstrated in the past that the section meetings are usually of more direct value to the members of the Association than those of the general sessions, and with this in view, most of the sections are planning to have an extra session. Members desiring to contribute to the programs of either the general Association or the sections should communicate immediately with the officers who are arranging the programs. For the convenience of members the following list of persons is given who are actively engaged in the preparation of the programs:

General Association, Professor Selskar M. Gunn, 755 Boylston Street, Boston, Mass.
Laboratory Section, Professor Edward Bartow, University of Illinois, Urbana, Ill.
Section on Vital Statistics, Doctor W. S. Rankin, State Board of Health, Raleigh, N. C.
Municipal Health Officers' Section, Doctor John H. Landis, Health Officer, Cincinnati, Ohio.
Sanitary Engineering Section, Mr. R. S. Weston, 14 Beacon Street, Boston, Mass.
Sociological Section, Mr. Homer Folks, 105 East 22d Street, New York City.

Suggestions would also be welcomed of subjects which should be taken up at the meetings. It is hoped that every member of the Association is planning to be in attendance.

Now is the time to induce suitable persons to join the Association and the Secretary will be very glad to send application blanks and circulars of information to any member who can assist. Co-operation on the part of the membership of the Association is earnestly urged.

TWO WAYS BY WHICH VITAL STATISTICS CAN BE MADE MORE USEFUL TO THE HEALTH OFFICE.

G. W. Atherholt,
Chief, Division Vital Statistics, Bureau of Health, Philadelphia.

Read before the Joint Session of Sections of Municipal Health Officers and Vital Statistics, American Public Health Association, Washington, D. C., September, 1912.

The part that vital statistics play in the prosecution of the health officer's work in controlling epidemics, and furnishing the basis for instituting preventive measures, for the preservation of public health, is an important one and by many is considered to be the most important since the data so furnished is considered to be more definite and fixed than that produced by morbidity statistics.

But let us be fair with ourselves. Are our vital statistics correct or accurate, and if not, how can they be made so? This is a much discussed question and one that deserves the fullest consideration of all interested in public health work.

One of the chief difficulties we find is lack of definiteness of some physicians and apparent carelessness and indifference of others in stating causes of death, a condition which is not peculiar to Philadelphia. Many specific instances of this feature of vital statistics work have been collected, and commented on in the various publications of the United States Census Bureau, and the rules created by that Bureau have been of great service to the vital statistician. These rules, however, chiefly refer to cases where two or more diseases are jointly reported, and for this reason need not be further discussed.

We have for a long time held the view that the greatest trouble, and the one which occasions the greatest discrepancy in our disease tabulation, is caused by the careless, indifferent or ignorant doctor, who simply gives terminal conditions as the cause of death. As an instance of this, in the decade from 1871 to 1880, in Philadelphia, the deaths reported as caused by heart diseases, represented 4 per cent. of the total deaths, and, in the decade from 1901 to 1910, they represented 9 per cent. an increase of more than 100 per cent. The actual increase is even greater than this, for the reason, that in the first period, physicians were only required to give a cause of death. No contributory cause was asked for, and burials were made on death certificates, which were sent to the health department, in bulk, from the cemeteries at the end of each week. Lack of inspection before permission to bury was given placed no check whatever on the physician in stating causes of death. When we consider that today, we not only ask for the chief and contributing causes of death, but the duration of each, and require that the certificate must pass competent scrutiny before a permit for burial is issued, we can well imagine what this increase means, and what is true of heart diseases may also be true of several other diseases.

What is the reason for this condition? In conversation with scores of physicians upon this subject we are firmly convinced that lack of knowledge of the uses to which vital statistics are put is the principal cause, and this can in a large measure be overcome by each medical college, incorporating in its curriculum a short course of study on the uses of vital statistics, and the importance of correct statements of causes of death. An easy way to accomplish this is to have State Boards of Medical Licensure include, in their examinations, questions bearing on the subject. However, any method by which it can be brought about is worthy of the best effort of the American Public Health Association.

In the prosecution of work in child hygiene for the prevention of infant mortality, the first feature to be considered is the prompt and accurate reporting of births. In fact, it is the foundation upon which all such work must rest.

For six years, backed by what has been considered a model state registration law, we have endeavored to perfect birth registration in Philadelphia, and in that period, the rate per 1,000 of population has increased from 23.39 to 25.37, and yet with 40,666 births reported for 1911, we estimate that we are receiving only about 90 per cent. of the births which actually occur.

We have proceeded on the theory that the delinquent doctor or midwife should be prosecuted as the law prescribes, and while prosecutions at first produced substantial results, we could by this means reach only a limited number. We have since the beginning of this year tried the method of notifying the physicians by postal card whenever a birth was received after the ten days prescribed by law for reporting and asking for an explanation of the delay. This has enabled us to reach a much larger number, thereby securing greater coöperation and better results than by the other method. However, the hundreds of replies received furnish interesting reading, and while many of the excuses are frivolous, quite a large number have been serious and have caused us to consider whether we are not proceeding wrongly in placing the entire responsibility on the doctor or midwife. The clerical work imposed on them by the present law is considerable and the liability to error in making out a large number of reports is great. Moreover, we find conscientious doctors and midwives do not care to send in incomplete reports, and as most children are not named within ten days, we question very much whether they should be required to do so, for many of these incomplete reports are for one reason or another never completed.

If, however, the law could be strictly enforced it would not bring these reports in in time to be of efficient service to the health officer.

The following plan is therefore submitted as overcoming some of the difficulties. It will require changes in existing registration laws, and may not be adaptable to all localities, but for large centers of population where the bulk of the baby-saving work is being performed, would no doubt work well.

Supply your physicians and midwives with printed postal cards, requiring them to simply state thereon that on a certain date he or she delivered Mrs. ——— residing at ——— Street, of a living or dead born child. Require that the card shall reach the department within twenty-four hours after birth. This will put the health officer in immediate touch with every new born babe. Let the doctors and midwives know that their responsibility ends with the mailing of the card and you will at once get their hearty coöperation.

Index the cards so received and immediately mail to the parents of the child, a birth blank to be filled out, a stamped envelope for return of same and enclose with these a circular explaining the law and its penalties and the importance to them and the child of correct and prompt registration. These instructions to be printed in as many different languages as circumstances require. Give them 15, 20 or even 30 days in which to return the completed report. At the expiration of the given time, have an agent of the department call on the parents of all who have not reported and bring the report in.

This will gradually educate the parents themselves to the necessity for registration. More than this, and it is by far the most important feature, it will fix the responsibility for correct data in birth certificates where it properly belongs (on the parents of the child).

Time after time, we are told, by parents who apply for copies of birth certificates to be used to obtain employment under factory inspection laws, or to have children admitted to school, that the doctor or midwife erred in making out the report. The name or names of the parent or parents are wrong. The date of birth is wrong, the name and sometimes the sex of the child is wrong, and in hundreds of cases no first name is given, and the parents are prepared to swear that it was told to the doctor or midwife at time of birth.

The only cases which this plan seemingly will not reach are those in which no physician or registered midwife was in attendance, and these we do not now reach. However, any plan that will awaken the interest of the parents in registration will ultimately reach even these.

This plan will also be found much cheaper than that of paying a fee for reports, and based upon 40,000 births in Philadelphia, can be carried out at an estimated expense of about ten cents per birth, five cents of this being for postage, which could be saved by having Congress extend the franking privilege to cover all correspondence connected with the reporting of vital statistics.

THE PRACTICAL VALUE OF VITAL STATISTICS IN THE SOUTH.

W. S. Rankin, M. D.
State Registrar of North Carolina.

Read before the Section on Vital Statistics, American Public Health Association, Washington, D.C., September, 1912.

One can hardly have any adequate conception of the value of vital statistics who has not had personal experience in their application. I have found vital statistics worth more than all other considerations combined in moving thoughtful, practical men to intelligent and effective interest in the public health of their localities.

As examples of the value of vital statistics to me in our campaign I wish to cite several concrete cases:

One has only a short experience as a health officer before he finds out that in going to any town, city, or county to inaugurate sanitary reform he encounters, as the principle obstacle in his way, the unanimous and fixed opinion of many influential citizens of the place that their particular town or community is remarkably healthy. Their own opinion, they are inclined to value above the opinion of a stranger; for, although the stranger may be an expert in sanitary matters, they realize that they base their opinion upon long observation and an intimate knowledge of local conditions. It is not easy to get out of the mind of the business interests of a town or city the presumption that they are healthy, and that their opinion is only presumption, and that, as a matter of fact, they are not competent to hold an opinion as to actual health conditions in their municipality. Last winter I had the honor and privilege of addressing the Carolina Municipal Association. This organization is composed of the municipal officials of the State of North Carolina, including the mayors and aldermen, city clerks and other officials of the towns and cities in our state.

The night before I was to speak to the aforesaid organization, realizing that practically every man would set aside what I had to say about municipal health, feeling sure that I was not referring to his own healthy (?) town, I did the following experiment in order to open their minds to unprejudiced consideration of their most vital problem: Selecting five of the best known and most intelligent citizens of Raleigh, they were called over the 'phone and asked two questions: The first was, "What is your idea of the condition of our city's health?" Without a moment's hesitation, they all replied that it was good. The second question was, "How many deaths do you suppose occurred in the City of Raleigh last year?" Before answering this question there was evident hesitation, resulting from a feeling that they should have been able to answer, at least to their own satisfaction, the second question before answering the first, then the answers came as follows: From a college president, sixty; a well-known banker, sixty; a leading merchant, sixty; a state official one hundred; and a practicing physician, three hundred. All these gentlemen were asked these questions independently and knew nothing of the answers given by the others. The banker, college president, and the merchant evidently guessed five deaths a month, and multiplied that figure by twelve. As a matter of fact, there were five hundred and eighteen deaths in the City of Raleigh last year, but sixty-two less than the sum of the guesses. These five intelligent and public-spirited citizens represent the attitude of the average citizen in matters touching the question of municipal health; they all have opinions resting on mere presumption, unsupported by facts.

The next day I had an attentive and, from their numerous expressions, an appreciative audience, and I opened their hearts to what I had to say with the facts of vital statistics.

Another example: in the summer of 1910, I was invited by a board of county commissioners and board of aldermen to visit their county town and inspect a small collection of water on the outskirts of the town that was supposed to be responsible for a large amount of their sickness. After looking over the pond in the morning and making a general sanitary survey of the town, I walked over to the local registrar's office to see how many people were dying and what they were dying from. At five o'clock I consulted with the board of aldermen, several physicians, and health officers and others. I called their attention to the fact that the small collection of water was but one very small item for consideration in their health situation; that malaria had caused very few deaths in their town, and it was doubtful if the pond had much to do with their malaria as there were so many other breeding places for mosquitoes; that with a little ditching and kerosene oil (I went into details), the pond could be dismissed as a health menace; that whereas the pond was of little consequence, other conditions of health in their city were of grave consequence; that, taking statistics from their own official, they had a death rate of 27.5 per thousand which meant 12.5 people out of every thousand of their population died in excess of the average death rate that obtained throughout the United States; that for four thousand population this meant an annual unnecessary loss of fifty lives to their town; that even if they had a death rate of fifteen some of the fifteen would be from preventable diseases and, therefore, the fifty lives lost must necessarily be regarded as *excessive* preventable deaths; that their records showed a death rate from tuberculosis of three hundred and seventeen per one hundred thousand instead of the average of one hundred sixty-seven; that their records showed a death rate from typhoid of seven and one half times the average; that during the last winter their town had had its share of deaths from measles for sixty years; that this last fact meant one of two things: either an extremely malignant epidemic or more probably inefficient quarantine; that they were most inconsistent in having required a railroad that passed through the town to build an overhead bridge at a cost of $18,000 because during ten years the railroad had killed, at a crossing, as many as ten people; that the interest on the original investment of the railroad, and the wear and tear of the bridge, would amount to at least $1,500 per year, which they were forcing the railroad to spend to prevent one needless death; that while they were requiring the railroad to spend this amount to prevent *one* death, they, the aldermen, were spending only $150 to prevent *fifty* deaths.

Since that visit, and, I believe largely as a result of that visit, that town and county has taken an unusual interest in public health work. Among other things I may mention that they had, for some time, their town clerk distribute one thousand of our monthly *Bulletins* each month in the homes of their citizens, and now the county health officer has added about eighteen hundred names of the more intelligent and influential citizens of the county to the *Bulletin* mailing list. I regard that town and county at present as being one of the most promising localities in our state for sanitary progress.

Another concrete example of the value of vital statistics: I was invited some time ago to visit one of the principal cities of North Carolina to discuss, at a mass meeting of citizens, their health conditions. While driving over the town, preliminary to the meeting, I met one of their most influential men who inquired of me why I should come to his town to discuss health conditions when their municipal health was remarkably good. I asked him how much he knew about the health of the town. He replied that he had spent most of his life there, and that he was thoroughly familiar with the city, and he supposed he knew a great deal more about it than I did. With a significant smile he asked me what I knew about the health of———. I told him that it would not take more than two minutes to prove to him that I knew a great deal more about the health of ——— than he did. To start with, I asked him if he knew how many people per thousand died each year in the United States. He did not. The smile began to disappear. I told him the average annual death rate was fifteen per thousand. Then I asked if he knew the death rate per thousand of ———. The smile was gone. He did not. I informed him that it was 29.5 and that it was the largest death rate in North Carolina, and that, moreover, the figures that I was giving him he could get for himself from his town clerk; that they were *his own* figures. I further gave him the death rates from most of the preventable diseases for his town and told him the average death rates for those diseases throughout the United States. I impressed him with the fact that the excessive preventable death rate of 14.5 per thousand for his city's population of six thousand meant a needless sacrifice each year of 100 lives. I also pointed out to that gentleman that the colored population of that town had a death rate of fifty-two and two tenths, which would be a disgrace in the Philippines much less in a civilized community. My self-satisfied friend soon became an attentive listener and today he knows that his town must at an early date pay proper attention to its public health. That night I gave my audience the same facts, and am satisfied that within a short time vital statistics will replace self-satisfied presumption about health conditions and bring about sanitary reform in that town that so much needs it.

Another concrete example of the value of facts *versus* presumption: A town of forty-two hundred has inaugurated a campaign for meat and milk inspection. The cause of the campaign and the thing that will give that town pure meat and milk is the following tabulation published in the daily paper of the town.

Let us see how this looks tabulated.

Deaths per one thousand inhabitants.

United States	15
Tarboro	26

Per cent. children under five years to total deaths.

United States	26.8
Tarboro	51 plus

Deaths from diarrhea and enteritis per one thousand inhabitants.

United States	1.7
Tarboro	4.19 plus

I could continue to cite examples of the force of vital statistics when applied to the practical brains of a community. There are many people who will become enthused over generalities, but the practical, cool heads that we usually find dictating municipal policies are men who want facts, and the only way to reach this necessary influence in bringing about sanitary reforms is through vital statistics. Vital statistics are the right arm of the health officer, and, in my opinion, the greatest defect in our Southern States in promoting sanitary progress is the absence of vital statistics. As some one has said, "They are the chart and compass of the sanitarian" and he who attempts sanitary campaigns and neglects vital statistics will sooner or later find himself lost in a sea of generalities.

IDENTIFICATION RECORDS FOR UNKNOWN DEAD.

Thomas H. D. Griffitts, M. D.,
State Registrar of Vital Statistics, Springfield, Ilt.

Read before the Section on Vital Statistics, American Public Health Association, Washington, D. C. September, 1912.

In Tennessee, when I was a boy, I recall with what a community of interest the populace gathered around to view the carcass of a hog, when it became known that a strange "hawg" had been found lying dead by the railroad track. Each man came to compare distinguishing marks of the dead hog with those of his swine. Aside from the characteristics of his particular breed, Farmer Jones "marked" his with a "crop off the right and an underbit in the left." Neighbor Sander's mark was that of an "overbit and underbit in the right and a slit in the left." Thorough investigation was made to determine in what manner the hog met death and to whom it belonged. By the natural and the acquired characteristics, the great majority of the animals were recognized, three disinterested parties appraised them, and proper adjustments were made. If, however, the rightful owner failed to appear, the foreman made accurate notations of the peculiar marks and conditions and the railroad company was furnished with a record. That hog had a valuation in dollars and cents. Someone might claim damages later, offering definite descriptions in justification of his contentions.

In the United States, and I believe this applies to other countries, if a *man* is so unfortunate as to meet accidental death, foul play or other sudden death among strangers, though he may have many characteristics by which relatives or friends might identify him, no central body ever knows of them. A coroner's jury, frequently of little, if any, scientific value, evolves a verdict of death from "a sudden attack of heart failure," or "unknown" cause and of an unknown person. The dead body is kept a day or so, awaiting some one to claim it, when the county, with reluctance, makes a frugal expenditure for a pine box which is carted out to the potter's field. A career is ended. The State Board of Health gets this description of the deceased, if it gets any: Name, unknown; sex, male or female; color, and apparent age. You know the dead one belongs to the genus homo, that he is white or black, red, yellow or brown, was young, middle-aged or old. Here the personal description stops; 50,000,000 people in the United States answer this description. Nobody delves into the dead one's past, nor sings his requiem. The last remains are put away under the blazing sun of the tropics, beneath the snow laden pines of the North,—

somewhere in an uncared-for spot in God's Acre, where no loved one drops a tear or tender hands may place sententious flowers.

Upon assuming the duties of registrar of vital statistics of the State Board of Health of Illinois, the writer was impressed with the large number of unknown or unidentified dead reported to the board, and by the dearth of information supplied by the death certificate which is prescribed. True, a few states have statutory requirements for identification remarks by coroners, but the actual records are meagre, filed with doubtful availability in the various counties, with no central bureau or office having a description.

The inquiry may be made, "Why is this a matter of concern to a health organization?" As a matter of primary importance, it is not perhaps, under normal conditions, neither is the registration of other vital statistics. But suppose that in some of our coast cities today,—New Orleans for instance,—the dead body of a stranger is found in a rooming house where sailors or immigrants are accustomed to stop, the local health officials as well as the coroner will first be interested in what caused the death; the next questions for solution are from whence came, and who is the deceased. Autopsy may disclose conditions pathognomonic of bubonic plague. No papers, cards, or other personal effects are suggestive of the identity, or from whither he had journeyed. Next in importance to the cause of death, is the identity of the deceased, both from a sanitary and from a legal standpoint. Two sources of information are required in order to arrive at a proper diagnosis of a disease—the subjective and the objective. The latter is obtainable in the unknown dead as readily as in the known dead. The subjective, partly through distinguishing marks, may be supplied, and it may not be improbable to locate foci of infection by establishing identity.

I devised the special certificate which, with the approval of Dr. J. A. Egan, superintendent of vital statistics in Illinois, has been put into force in the state, since April, 1912. This certificate is the same as the other form of coroner's certificate, with the exceptions that it is of a contrast color, rendering it readily noticeable, and on the back of the certificate there are two models or diagrams of the human body, one showing the front, and the other the back view. A very much abbreviated Bertillon system—one requiring, of necessity, little skill in its application,—has been inaugurated. Above the diagrams are blanks for the height expressed in feet and inches, the approximate life weight; two rows of figures, upper and lower, ranging from 1 to 8 inclusive, representing the teeth in each jaw, and the coroner is instructed to cross out or indicate the teeth missing or artificial. Below the models are the following instructions to the coroner:

MARKS OF IDENTIFICATION:

Indicate on diagram No. 1, beginning at the head and face and continuing to the arms, forearms, chest, abdomen and lower extremities, the exact location of scars, moles, warts, tatooes or other marks, stiff joints, missing or deformed fingers, toes, or other distinguishing marks or conditions. Draw a line extending from the location of the marks of identification outward to the side of the diagram and describe the marks as "R. S." (round scar), "L. R. S." (large round scar), "S. R. S." (small round scar), "L. S." (long scar), "I. S." (irregular scar), "R. M." (round mole), "B. M." (brown mole), "Vac. S." (vaccination scar), etc. Also give color of hair, and, if adult male, indicate presence of mustache or beard.

Use the same method for the posterior surface of the body; indicating marks from diagram 2. Indicate missing teeth by crossing out the proper figures above No. 1 diagram. Gold teeth or false teeth also may be indicated in this way, but a note should be made explaining whether false teeth, gold teeth, etc. Also fill in blanks above diagram 2 for height and weight

The instructions and records might be extended to include a complete anthropomelogical survey, according to the Bertillon system of identification and classification, dactyloscopy and photography, but any method to be used by the coroners, must be made as simple and yet practical as possible. The office of coroner, as I am led to believe is the case generally, is too often held by the incompetent, who selects the office from a "vacational" as well as from a "vocational" consideration.

In putting into use the special certificate, and desiring the full coöperation on the part of the coroner, I addressed a communication to each coroner in the state, asking his opinion of a plan to photograph each unknown dead body, giving a copy to at least one local paper and sending one to the Bureau of Vital Statistics, together with the special certificate. The coroners, with few exceptions, approved the idea, but many stated their respective counties would not stand for the expense. In fact, one gave us the startling statement that his county had refused to pay 50¢ for a telegram to members of a family to which the unfortunate deceased was supposed to belong. So, additional to the special corner's certificate and record, coroners are merely requested to supply a photograph when they can do so without expense to themselves. Up to this time, several have forwarded photographs. To render the fullest service, complete descriptive lists, together with cuts, should be published and given wide distribution.

A few words as to the recording of the certificate upon receipt by the State Board of Health. Exact copies are made on similar blanks, and kept on permanent file, arranged serially according to the date of receipt. I have, in addition, designed a signaletic card for filing, in order that a ready reference may be had. On the following page is shown a specimen card.

These cards are then filed in the order of their most pronounced distinguishing features. The original certificate is treated as the certificates in general, finally being returned to the office of the clerk of the county in which the death occurred, for permanent file.

As to the feasibility of identifying the unknown dead by this method, I would state that relating to the criminal class, there is scarcely one of the larger cities in the world but that employs the Bertillon system of identification, either alone or with other methods, as finger and thumb printing and photography. The United States Army and Navy, and the Department of Interior have similar records, and many institutions, as certain banks, and hospitals for the insane, correctional institutions and the like, also keep records, through which identification may be effected, so that

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Certificate No. ...... Supposed to be .... Date of death ....

Sex .... Color .... Age .... yrs. Height .... in. Weight .... lbs.

Front. Rear.

Head .... Head ....

Face .... Face ....

Chest .... Chest ....

Abdomen .... Abdomen ....

....

Upper Extrm.
- Right ....
- ....
- Left ....
- ....

Lower Extrm.
- Right ....
- ....
- Left ....
- ....

Teeth
- Upper
  - Right ....
  - Left ....
- Lower
  - Right ....
  - Left ....

Clothing, Personal effects, Remarks ....

....

Cause of Death—No. .... County ....

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were a more complete record of identification made of the dead, including accurate anatomical descriptions, and finger printing, duplicates might be found of those previously recorded in these various departments. For the majority of the unfortunate "unknown," however, under present conditions, the more gross and commonly known characteristics will have to suffice. I believe the time may come, however, when finger printing, known absolutely and unequivocally to identify an individual, from the seventh month of intra-uterine life till after death, will be made a part of each certificate of birth, and will be required of patrons of steamship and railroad lines, in insurance examinations to prevent fraud, to purify the ballot box by eliminating repetition in voting, and extended to various commercial transactions.

Heretofore, we have looked upon systems of identification as concerned almost entirely with the detection of crime. Now, as sanitarians the world over are receding, from the fomites principle of the spread of disease, and are attaching greater significance to man himself, we will lend more energy toward following the movements of the individual. And as the state owes it both to the living and to the dead that proper and accurate records be kept concerning deaths, it is but an extension of the obligation that each decedent be identified and a personal characteristic record kept.

It seems to me also, that it is not without the proper province of our United States Public Health Service or the Immigration Bureau to furnish state health officials with more detailed information of immigrants. Especially might this be commendable in times when thousands of immigrants from plague or pestilence infected countries are scattering throughout the various states. Finger imprints and anthropomelogical records of immigrants would strengthen what is already the greatest barrier against imported pestilence ever known,—the present United States Public Health Service.

Life insurance companies could, to a certain extent, protect themselves against possible fraud by finger printing each would-be-policyholder, as a part of the medical examination. Probably more than eighty per cent. of the insurable male population today carry some form of life insurance, and it is the male that constitutes almost all of the unidentified dead. Should each medical examination embrace the simple procedure of finger printing, a standing record of identification of incontrovertible accuracy is made, and should the coroner's record be extended to include finger printing, it would go far in making known the identity of the 2,500 estimated unknown in the United States that are annually laid beneath the sod, with no marks of respect and no record of identity.

THE STATEMENT OF DURATION OF DISEASE ON DEATH CERTIFICATES AS A DETERMINING FACTOR IN CLASSIFYING CAUSES OF DEATH.

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Read before the Section on Vital Statistics, American Public Health Association, Washington, D. C., September, 1912.

In discussing statements of duration of disease on death certificates in their relation to the statistical disposition of deaths, I wish to state that I realize that this is only one of the several standpoints from which the subject of duration of disease offers a field for comment. It is easy, for example, to imagine cases where it might be of great value in adjusting insurance claims, in showing the presence of mental, nervous or other diseases, at the time of making wills, contracts, or participating in other legal transactions; indeed, one might hypothecate a case in which it might be used in proving the date of birth of a child in one of the too numerous instances where births fail of registration: a mother might die of the effects of a Caesarean section, ten days, let us say, after the operation was performed—if no other record could be produced in later years, the accurate statement of duration in such a case might prove just the evidence needed of the date of birth.

Passing these matters, however, and looking at the question from the viewpoint of one whose vocation involves the "editing" of statements of cause of death, as they come to the Vital Statistics Division of the Bureau of the Census on transcripts received from various state and municipal boards of health, I wish to lay particular stress upon the importance, if not the *necessity*, of accurate statements of duration as essential factors in the determination of the correct headings or titles of the International List of Causes of Death to which certain cases should be assigned. Expressions of opinion from you gentlemen as to how far we should go in considering the statement of duration to be a component part of the statement of disease or cause of death will be both interesting and helpful.

Now in this connection, your attention is directed to the fact that the assignments of deaths from certain diseases, returns of many thousands of which we receive every year, are—according to the International List—governed by the qualifications *acute* and *chronic*. Let me cite some of the most important: *Acute* bronchitis is assigned to title No. 89 and *chronic* bronchitis to title No. 90; *acute* rheumatism is classified under title No. 47, the heading of which is "Acute articular rheumatism," while *chronic* rheumatism is compiled under title No. 48, "Chronic rheumatism and gout"; *acute* endocarditis is the title-heading of title No. 78, but *chronic* endocarditis appears as one of the terms included under title No. 79 (organic diseases of the heart); *acute* hepatitis is assignable to congenital debility (title 151) or to the residual heading denoted "Other diseases of the liver" (title No. 115) according to the age of the decedent, but a return of *chronic* hepatitis is counted as a death from "Cirrhosis of the liver" (title No. 113); *acute* nephritis goes under title 119 and *chronic* nephritis under 120. Many others might be cited, but these are the ones of greatest numerical importance.

I am well aware, as noted in the Introductory to the Manual of the International List of Causes of Death, that, according to leading authorities, "the terms *acute, subacute* and *chronic* have lost their pathological and much of their clinical meaning, and may even be actually misleading;" but the fact remains that the International Classification still recognizes these terms as the bases for making distinctions in the classification of many of our most common diseases, and as this same classification is the vital statistics gospel, we must deal with these reports accordingly—at least, until the advent of another revised version. The application of the statement of duration here is easily appreciated, but two questions immediately suggest themselves—(1st) Shall the statement of duration be regarded as a component part of the statement of cause of death?—and (2d) if so, what period or limit of duration shall be construed as marking the dividing line between acute and chronic conditions? *A* dies of hepatitis having been ill therewith for eleven months and twenty-nine days; *B* dies of hepatitis after a siege of a full year; now did *A* succumb to acute hepatitis and *B* to cirrhosis of the liver (under which heading chronic hepatitis is classified); did both die of acute hepatitis or did both die of cirrhosis of the liver? I realize that there is likely to be much difference of opinion as to the proper dividing line, but the International List is full of arbitrary distinctions with respect to the classification of many diseases on the bases of *age* and *sex*, and the difference of one day in the *ages* of two decedents who died of what (according to the reported cause) one *might* presume to be the same disease, often compels us to compile their deaths under different headings. The International classification makes no provision about the item of duration, either with respect to the regulation of preference when causes are jointly returned or with reference to this question as to whether or not the duration is a part of the statement of cause of death; in fact, the item does not appear on many European forms. We are in no danger, therefore, of violating either the spirit or the letter of the law as far as the International List is concerned for the simple reason that on this question there appears to be neither letter nor spirit to violate.

Now the Standard Certificate provides for the statement of duration. In some cases the space is used and the information given on the transcripts received by the Bureau of the Census and in others it is not in evidence. In some cases it is apparently reliable and in others it is undeniably unreliable, as I hope to demonstrate. Let us put the question of the use of this item in our work of "editing," then, in this form: In cases where the statement of duration is apparently reliable shall we consider it a component part of the statement of cause of death, and if so, when the classification of terms is governed by the qualifications *acute* and *chronic*, what term of duration shall be the dividing line?

In general, I believe that statements of *long* duration are reliable while those of short duration are unreliable. If a physician writes *two* years in the duration space following a report of bronchitis, or hepatitis, or nephritis, we can safely assume that this approximates, in the physician's knowledge or opinion, the period of time covered by the illness of the decedent. On the other hand, it can *not* be taken for granted, if he writes *ten days* that *this* represents the real duration of the disease and that it was therefore acute, for it has been conclusively demonstrated that these statements of short duration frequently cover only the terminal sickness or the period covered by the signing physician's attendance. Many certificates are encountered every year, on which diseases that are essentially chronic are described as having durations of *days*, and very frequently we handle transcripts on which the disease is *qualified* by the word *chronic* and yet the stated duration is one of *days*.

If we absolutely disregard the item of duration of illness, we shall classify many deaths whose assignments to certain titles are plainly indicated thereby under headings to which they do not belong, and if the length of duration that could be construed as definitely defining (for purposes of classification) the chronic character of certain diseases can be agreed upon, it seems to me that, in the final analysis, we shall get more satisfactory results than by disregarding an item for which our "Standard certificate" calls. Doubtless the physician, in most cases, does not consider it necessary to qualify a statement by the word *chronic* when he writes *two* or *three* or *ten* years in the duration space.

There are times, indeed, when to disregard this item in editing causes of death would mean classifying returns in such a way as to be absolutely untenable. Suppose the report is *Scarlet fever-Nephritis*, the former being given as the "contributory" cause, the age—let us say, twelve years. Now with *no* statement as to duration, or one of short duration, the natural inference is that the renal lesion was *acute* nephritis, which is about the most frequent fatal complication of scarlet fever. In many cases, however, this scarlatinal nephritis becomes chronic. Now, is it not quite evident, if there is a stated duration of three or five years for each of these diseases, that the "nephritis" was chronic dating from the attack of scarlet fever three or five years before; that there *was* no scarlet fever present at the time of death, nor had there been for years before; and that it would be a grave error to charge this or any other death to an *acute* infectious disease, cured, and *not* present, which, in fact, resulted from a *chronic* condition which happened to date from that acute infectious disease and was undoubtedly the one under which the death should be classified? If the physician had written the whole history of such a case, no one would think of assigning the death to the scarlet fever; but the space provided on certificates for the description of causes of death is not sufficient for detailed case histories, and in such instances, physicians are justified in taking it for granted that correct particulars as to duration are sufficient to show the true nature of the condition that caused death. Why, then, does he write *scarlet fever* at all if it was not an active cause of death? One does not have to handle death certificates long in vital statistics work to learn that many physicians do not have in mind when writing them the disposition that is to be made of them statistically. The certificate *calls* for a contributory cause and does not specify whether it was recent or remote. Knowing that the nephritis dated from the attack of scarlet fever, he fills out the certificate to that effect, giving the latter as the contributory cause and also filling in the duration. A note under acute articular rheumatism (Title 47, Manual of the International List of Causes of Death), warns us that this title does not include chronic organic diseases of rheumatic origin, but only the correct statement of duration, at times, will serve as a competent guide by the aid of which we can determine whether certain diseases jointly reported with rheumatism were simply intercurrent affections not dependent thereon or whether they were of rheumatic origin. Thus it is seen that in dealing with joint causes, we must, perforce, take this item into consideration, as it often shows the primary cause to be one not otherwise indicated. Some years ago a transcript was received on which some disease was reported in conjunction with "gunshot wound." The transcript was returned to the source from which it came with a request for more definite information in order that we might be able to classify the death as a suicide, homicide or accident. On the return of the transcript it developed that the gunshot was received during the Civil War. Had a duration of forty or forty-five years appeared on the transcript, it is needless to state that we would not have considered including this case among those to be tabulated as due to violence.

Some years ago the Bureau of the Census published a pamphlet entitled "Modes of Statement of Cause of Death and Duration of Illness on Death Certificates." In this pamphlet the importance of accurate statement of duration of illness in its relation to the compilation of mortality data is very thoroughly set forth and most phases of the subject fully discussed. It does not, however, say definitely whether or not the statement of duration should be considered a *part* of the statement of cause of death. As one confronted daily with this problem, I quote one sentence, which, I think should interest all registration officials. It is "Many registrars decide as to the "acute" or "chronic" character of certain diseases by the duration stated, or, in the absence of a statement of duration, by the period of medical attendance." On the transcripts received from many states and cities by the Bureau of the Census the title number of the International List showing how the state or municipal office classified each death appears, and these numbers show that the statements of duration are frequently the bases of assignments. I am quite sure that expressions of the views of these "Many registrars" with regard to the location of this statistical deadline would be both interesting and instructive. It seems to me that there should be agreement on this matter; there is no good reason why practice should be unsettled. Many thousands of assignments are affected—enough, undoubtedly, to change a number of death rates. It is true that general European practice lays little stress upon the element of duration, and many European certificates do not contain this item. It is part of our own "Standard certificate," however, and it seems to me that we should make the most of it.

SOME NEWER PROBLEMS AND SOME NEWER PHASES OF THE ANTI-TUBERCULOSIS WARFARE IN THE UNITED STATES.

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Read before the American Public Health Association, Washington, D. C., September 19, 1912.

(*Concluded*)

My communication on the subject of the newer problems and phases of the anti-tuberculosis warfare would not be complete nor up-to-date would I not mention here a new method of treatment for advanced cases. I refer to the operation producing artificial pneumothorax. This is one of the most valuable adjuvants in the treatment of this class of sufferers. For want of space I must refer for details concerning indications, technique, and results to the already considerable literature on the subject; particularly to the works of Forlanini,[6] Spengler,[7] Brauer,[8] and Saugman[9] of Europe, and Murphy,[10] Lemke,[11] Lapham,[12] Robinson & Floyd,[13] Balboni,[14] and others of our own country. All I may say here is that the results in the relief and not infrequently the seeming arrest of the disease in quite advanced cases has been surprising.

That we often encounter objections to entering a sanatorium even among the earlier cases and also the well-to-do, is a well-known fact. This prejudice on the part of patients to entering sanatoria arises mainly in their fear of having to associate with individuals whom they consider more ill than they are themselves. Education through appropriate literature and tactful explanation on the part of the physician who sends the patient to the sanatorium, are the only remedies for this sanatorium-phobia.[15] A more serious reason why the poor consumptive hesitates to enter or to remain any length of time in a sanatorium or hospital, no matter how attractive and well-equipped it may be and how kindly he may be treated, is the thought of those left at home who may have been more or less dependent upon him.

I know from my sanatorium and hospital experience how badly the patient will do when anxiety and grief is added to his physical suffering; how his appetite will improve, serious symptoms will subside when the cause for his grief and anxiety has been removed. The care of the family when the tuberculous breadwinner is incapacitated, whether in sanatorium, hospital, or at home, is one of the newer phases in the anti-tuberculosis warfare which must receive our most serious attention. In Australia there exists a special tuberculosis invalid pension and ten shillings per week are granted to those in need and unable to work.

Among the following activities, which form the basis of our Health Department's work in New York, there may be relatively little that is new, but the summary of this tuberculosis work as it is now being carried on is a striking example of what can be done by an efficient health department of a great city.

There is (1) the notification and registration of all cases of tuberculosis, which was started in 1894. (2) The free bacteriolgical examination of sputum to facilitate early and definite diagnosis. (3) Educational measures of various kinds, circulars, lectures, newspaper articles; tuberculosis exhibits in the various parts of the city including outdoor exhibitions with moving pictures during the summer months. (4) Visiting of consumptives in their homes and continuous supervision of cases in tenement houses by a corps of trained nurses. (5) Free disinfection by the Department of Health, and issuance of orders for the renovation of rooms vacated by consumptives. (6) Reference of cases to proper charitable organizations. (7) The provision of five classes of institutions:

a. Free hospitals for advanced cases;

b. Free clinics for diagnosis and treatment of ambulant cases unable to go to sanatoria;

c. Free sanatorium for incipient and early cases;

d. Free day camps;

e. Establishment of the Tuberculosis Hospital Admission Bureau, for the proper selection of cases for institutional care.

(8) Forcing certain cases of patients into a hospital and retaining them there. (9) Enforcing regulations concerning spitting in public places. (10) Enforcing regulations forbidding use of public drinking cups. (11) Research studies concerning the mode of infection, the rôle of bovine tuberculosis, characteristic of the tubercle bacillus, etc.

An equally comprehensive program containing some newer phases of the problem and which in its ensemble might be considered a model for health ordinances for cities which are resorts for consumptives to follow, is contained in the report submitted to the Section on Preventive Medicine and Public Health of the American Medical Association at the session held in Los Angeles in 1911.* The subjects dealt with in these health ordinances are as follows:

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* Report by Committee: G. Walter Holden, M. D., Denver, Colo., Chairman; W. Jarvis Barlow, M. D., Los Angeles, Cal., and H. Anderson, M. D., El Paso Texas, Journal A. M. A., Dec. 9, 1911, Vol. LVII, pp. 1897–1900.

I. *Registration.*

Physicians' Duty to Report All Cases of Tuberculosis.

Duty of Authorities and Hospitals, Sanatoria, etc., to Report all Cases.

Duty of Managers or Owners of Hotels, etc., to Report all Cases.

Duty of Department of Health to Visit Patients in Hotels, etc., not Attended by Physicians, and to Leave Literature.

Duty of Department to Make Microscopic Examinations, and to Leave Literature, at Request of Physicians.

Duty of Department to Keep a Record of all Cases.

Penalty for Wilful Misstatement by Physician.

II. *School Children.*

No Tuberculous Child, or Child of Tuberculous Parents is to be Admitted to School Except by Permit from Department.

III. *Disinfection.*

Premises Vacated by Tuberculous Persons to be Disinfected. Such Premises not to be Re-occupied Except as Permitted by the Department.

Placard to be Placed on Door of Infected Premises.

Unlawful to Dispose of Belongings of Diseased Persons Unless Disinfected.

IV. *Public Fountains and Drinking Cups.*

No Fountain is to be Erected in Public Places or Buildings Unless Properly Constructed; No Drinking-Cups to be Attached to Public Fountains Unless Provision be Made for Properly Rinsing.

V. *Expectoration.*

Illegality of Expectorating in Public Places.

Posting of Notices Regarding Danger and Illegality of Expectorating.

Duty of Police and Others to Cause Arrest of Offenders.

Placing of Cuspidors for Use of Public and Employees.

VI. *Laundry.*

No Linen of Tuberculous Persons is to be Handled at Public Laundry Unless Sterilized.

VII. *Street Sweeping.*

Frequency of Sweeping and Removal of Dirt Once every 24 Hours.

Time and Method of Sweeping and Removal of Dirt between 6 a.m. and 11 p.m. and Previous Flushing and Sprinkling with Water.

VIII. *Food and Drink.*

Premises where Food is Sold Not to be Occupied as Living Rooms.

Articles of Food Carted Through Streets to be Properly Protected from Dirt, Dust, and Flies.

Articles of Food Offered for Sale to be Properly Protected from Dirt, Dust, and Flies.

No Tuberculous Person to be Employed at Manufacturing or Selling Foodstuffs.

Penalties.

IX. *Garbage.*

Duties of Owners, Tenants, etc., to Provide Proper Receptacles for Garbage.

Manner of Collection and Removal of Garbage, Once in 24 Hours in Watertight Tank and Closely Fitting Cover.

Garbage Not to be Used for Filling-in Purposes, or as Food for Animals Unless First Cooked.

X. *Manure.*

Accumulation of Manure in Vicinity of Dwellings Illegal Except as Approved by Department of Health.

Manner of Removal and Disposal of Manure, etc., Removed at Intervals Prescribed by Board of Health.

XI. *Smoke.*

No Dense Smoke to be Emitted Into Open Air from Any Building or Engine.

There is one feature of the dissemination of tuberculosis which, to my mind, has been overlooked by most of our authorities. I refer to the tuberculosis germ carrier who is not under the care of a physician. Such individuals are far more numerous than we think. Among these are, first of all, the patients who, although known to be tuberculous, think themselves free from tuberculosis germs because one or two examinations of the sputum were negative. Unfortunately, there are still some physicians who likewise consider the presence of the bacillus in one or two specimens of sputum as the only positive evidence of tuberculosis.

Besides the typical tuberculous patient without medical supervision or who has passed through the hands of a careless practitioner, there are the vast number of patients who go through life with relatively little functional disturbances, nay, even attaining old age because an early attack of tuberculosis has conferred upon them a relative immunity. Then there is another group of tubercle bacilli carriers who, on examination, show almost a normal chest and still their sputum is positive. I do not even venture an explanation for such a condition, but all those who see and examine a good many patients will and must admit that these seemingly physiological bacilli carriers exist.

The greatest danger arises, of course, from the bacilli carriers without a home. Our Tuberculosis Committee recently made an investigation which revealed that among the 29,460 cases of tuberculosis registered at the Department of Health of New York 5,053 were homeless. Of these 1,064 were actually without any homes, 2,099 were reported as "not found," 1,346 lived in lodging houses, and 544 in furnished rooms.

Aside of these homeless individuals there is that, alas, vast number of tuberculous patients among all classes of society who, although they know that they are bacilli carriers, still are careless in the disposal of their sputum or become so from the lack of provision of sputum receptacles.

The remedies I venture to offer to do away with the source of infection arising from these knowing and unknowing bacilli carriers are as follows: examination and reëxamination for tuberculosis, including repeated sputum examinations, of every individual who desires to seek employment in no matter what sphere. By such a policy the number of careless, homeless bacilli carriers may certainly be diminished. A careful physical examination should also be made of all school children and students in high schools and colleges, parochial and private schools, also of the inmates of prisons and reformatories, and of all muncipal and federal employees and officers.

Because of the very nature of the work of our post-office employees,[16] their handling of mail bags, packages, letters, and stamps which in turn are handled by the public, the stamps being moistened with saliva by the aid of the tongue, these employees should be examined and periodically reëxamined and no bacilli carrier permitted to continue to do work whereby he may become a source of infection. When one watches the selling of stamps at the average post-office in city or country and sees how the gummed side of the stamp passes over the window ledge which is fingered by hundreds of individuals every day, one cannot help feeling convinced of the likelihood of the transmission of tuberculosis and other microbic diseases by stamps and even letters. It should be taught to old and young that licking stamps is dangerous because of the possibility of contamination.

The masses should be educated to the effect that the sputum of any individual may be infectious, that it is dangerous to expectorate anywhere except in the middle of the street where the sputum may have a chance to be rendered inoffensive by the sun and air and will have little chance to be carried on the soles of people's feet into the houses. In public buildings and wherever possible sputum receptacles should be installed with covers to prevent flies and other insects from getting at the sputum. They should be well kept and frequently cleaned, and above them should be placards explaining the danger from promiscuous spitting. But instead of the headline "Do not spit here" or "Do not expectorate" we should rather attract the attention of the individual who must spit by the positive command "Spit here."

Everybody should be taught that to cough without holding one's hand before his mouth is not only impolite but dangerous. All kinds of germs such as those of tuberculosis, grippe and pneumonia, may be expelled with the small drops of saliva ejected during the so-called dry cough. The danger from droplet infection should be mentioned in the circulars prohibiting indiscriminate expectorating.

The masses should be most thoroughly educated concerning the danger arising from the careless spitter. This is, to my mind, one of the most important ways of diminishing the sources of infection arising from the bacilli carriers. For the comfort of the individual who may be so unfortunate as to be a tuberculosis bacilli carrier, let it be known, however, that by the proper personal care he may become a perfectly safe individual to associate with. His case is not at all to be compared with the typhoid fever carrier who should be isolated until all evidence of his being the disseminator of disease germs no longer exists.

The Chautauqua Salute, the waving of handkerchiefs by the entire congregation in honor of some person present or to express their religious joy, is, to my mind, a dangerous practice, as these handkerchiefs may often contain dried infectious pulmonary and nasal secretions. This custom should be suppressed by enlightened clergymen. It is particularly dangerous within doors.

The next important problem and a relatively new one is the employment of a discharged tuberculous patient. Until recently it was held that the best occupation for the cured tuberculous individual was farming, horticulture, or a similar outdoor occupation. When the individual who has contracted tuberculosis had been a farmer, the return to outdoor work when cured might be the ideal, but to make a tailor, a shoemaker, a carpenter, a bookkeeper, clerk, or teacher into a farmer after he has spent six months to one year at a sanatorium in an enforced physical idleness is an entirely different problem. Those who have studied the question most thoroughly are now convinced that it is best to return the cured patient not to his former environment, but to let him go back to his former occupation under improved conditions with his new knowledge of hygiene, his new need of fresh air and the experience he has gained as to the amount of work he can do.

Many of our more progressive sanatoria resort to occupation therapy as a means of strengthening and improving the patient's health. Graduated labor is, to my mind, one of the most valuable modern adjuvants we have in the hygienic and dietetic treatment of the tuberculous patient. The problem of occupying the patient arrested or cured, discharged from the sanatorium is a difficult one. He is rarely strong enough at once to return to his former occupation and resist the debilitating influence of overcrowding by day and night. I would suggest, therefore, in connection with our system of sanatoria and sanatoria-hospitals, intermediate stations which you might call health work stations where patients may be able to resume their former occupation in exceptionally good sanitary environments for at least six months after their discharge from the sanatorium. I am convinced that such intermediate stations would greatly reduce the number of relapses and much of the vast sums we are now spending for the care of tuberculous individuals would not have been spent in vain.

In a recent paper read before the State Medical Association of New York, I showed that we spent last year in our city over $2,000,000 for the care of the tuberculous and yet of the estimated 50,000 tuberculous patients of New York City 10,258 died. This is far too large a percentage for the sacrifices made by the taxpayers and the medical profession. I hold the frequent relapses and the hasty return of the half-cured patient to his former occupation in the same environments responsible for this altogether too great morbidity and mortality. Dr. David R. Lyman of the Gaylord Farm Sanatorium at Wallingford, Conn., has demonstrated that the arrested cases when following their usual trade under better hygienic conditions, live better than if they had endeavored to learn a new trade.

Professor Fisher showed that in this Gaylord Farm Sanatorium, with which he is also connected, it actually "pays" the State of Connecticut in cold cash to save the lives of consumptives, especially incipient consumptives. The $200,000 expended in this work has resulted in restoring so much working power that already those discharged from the institution have earned $300,000 and still have a potential earning power, good for many times this amount. On the basis of this experience, he concludes that every dollar expended in such institutions saves in a short time at least five dollars, to say nothing of the gains to the consumptive himself. At present, about fifteen million dollars a year is put into the tuberculosis fight in the United States. When several times this amount will be invested—enough to isolate or at any rate "educate" every one of the million odd consumptives in the United States, now spreading infection —we may expect to see the beginning of the end of the great white plague. We must be more rational in our prophylaxis as well as our treatment and in the aftercare of our consumptives, otherwise we will never master the disease.

As one of the newer problems in our fight against tuberculosis, I would be remiss in my duty would I not mention the all-absorbent question of the high cost of living. Not to have enough food or not enough nutritious food predisposes to tuberculosis. Every phthisiotherapeutist knows that ample food and good food is one of the essentials in the successful treatment of tuberculosis; and furthermore, those of us who are interested in the treatment of the tuberculous poor in institutions or at home know what a problem it is nowadays to make both ends meet, and yet provide enough nutritious food for those under our care.

I am not enough versed in statesmanship or politics to suggest a remedy along that line. The only thing which appeals to me likely to serve as an amelioration or perhaps even a rational remedy for the situation is to follow the advice of men like Mr. James J. Hill,* Professor Cook of Yale,[17] and the numerous experts of our Agricultural Experiment Station. Philanthropists and generous-minded citizens in general should coöperate with these experts to make agricultural life profitable and also pleasant. When by the provision of sound and sane social enjoyment and intellectual advancement for the young generation of farmers, living in the country can be made as attractive to young people as living in the city, when the farmers will have been taught to double and treble the yield of their products, and when transportation to the consumers will be made easy, farming will become an occupation to be sought by many. Its returns will be profitable and the consumer will receive the products which he needs at a cost within his means.

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* Letter to the *New York Times* of August 24, 1912.

I come lastly to that phase of the tuberculosis problem for which it is difficult to find a name, but which we might call "shifting the responsibility,"—sending patients away to be cared for by others. Whether this shifting of responsibility is done conscientiously or not, it is not fair. The Governor who pardons a tuberculous prisoner without being sure that this tuberculous individual will not become a burden to his family or the community, is not doing a fair thing. The Eastern municipality, physician or any individual who sends the poor consumptive to a Western state to let him there fight for himself until he becomes a burden to the strange community, is not doing a fair thing.

How keenly this injustice is felt you will see from the fact that near the middle of April of this year, at the call of Gov. O. B. Colquit of Texas, a Southwestern Conference on Tuberculosis convened in Waco, Texas, to consider "ways and means of aiding the tuberculous stranger in the Southwest and to discourage further migration of indigent consumptives to southwestern states."

The steamship companies which send their agents throughout Europe, advertising cheap rates, holding out great promises to the emigrants and bringing them here with tuberculosis to become a burden to the community, do not do a fair thing.

What is the remedy? Let us enlighten our pardoning governors on this subject. Let them be impressed with the fact that any discharged tuberculous prisoner with an open tuberculosis constitutes a menace to the community. The discharged or pardoned tuberculous prisoner is often, because of his social status, even a greater menace than the ordinary tuberculous individual. If special sanatoria for this class of patients are needed let them be established by the state.

Against the injustice of unloading the consumptive poor of one state into another, the above mentioned conference in Waco suggested a very good remedy which was: advocating publicity as to lack of free hospitals for stranger consumptives in those sections, the inability of charity organization societies to aid such, the difficulty of securing suitable employment, and the fact that consumptives coming to the Southwest should have funds sufficient to carry them for about one year. Of course, making the problem of the consumptive poor as much a state and federal problem as it is now a city and state problem, would be the most rational solution. Let a federal department of health assume the responsibility of controlling the care of all the needy consumptives and let state and city anti-tuberculosis agencies act under its supervision, and such injustice as making one state pay for the consumptive poor of others would not be possible. A good suggestion was made at the above-mentioned conference, namely, to call upon the federal government to convert abandoned forts and military reservations in the Southwest into sanatoria-hospitals for consumptives. In the meantime let every citizen realize the enormity of the offense of sending a consumptive without means to another state, and let him be punished for it if discovered.

Again, what can we do to stem the tide of tuberculous immigration? This is also a large subject and worthy of separate consideration.* Tuberculosis must be considered a world problem, a problem for every civilized nation. Let European governments understand that they must take care of their own tuberculous people as we take care of ours, and that in the end, by united efforts, it may be possible to conquer the white plague in all countries.

Every prospective emigrant should be examined to ascertain his freedom from tuberculosis by two competent medical men, one appointed by his home government and one by the steamship company which is to transport him to this country. A certificate showing freedom from tuberculosis, signed by these two medical men, should be in the possession of every emigrant wishing to come to these shores. An individual discovered to be afflicted with disease should be returned to the care of the authorities of the city or village from which he came with the diagnosis and recommendation for treatment. Exceptions can and should be made in the case of an individual with ample means who is simply visiting, or seeking to recuperate his health by a change of climate, or desirous to enter an American sanatorium for treatment.

The laws relating to deportation should be changed to the effect that if the holder of any such certificate, or any immigrant develops tuberculosis within six months to one year from the date of his arrival here and becomes a charge to the community, he shall be deported to the port whence he came. The expenses for this deportation should be borne by the steamship company who brought the immigrant to our shores, and not by the State Board of Charities.

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* I made it the theme of a special paper, entitled "The Immigration of the Tuberculous into the United States. A Problem for Every Nation." It was intended to be read before the Congress on Tuberculosis in Rome last April, but owing to my inability to be there it could only be read by title, but it was read in full at the recent Symposium on Immigration of the meeting of the American Academy of Medicine in Atlantic City, and appeared in the *Medical Record* of July 13, 1912.

The suggestion has been made that physicians of the Public Health and Marine Hospital Service be stationed at the important points of departure in Europe so that each emigrant can be thoroughly examined, and those entitled to a clean bill of health be allowed to take passage. I question whether the international law would sanction such a procedure. Secondly, there are too many minor ports from which emigrants could take passage and escape the United States government physicians' examination. Of greater value would it be for foreign governments and steamship companies to make it known that if a man expects to stay in the United States he must not become a public charge; that he must be physically, morally and mentally sound. With such publicity and the additional examination in the manner above outlined, the United States Government will be less burdened with the care of tuberculous aliens who, uncared for, are a constant menace to the community.

For want of space I must refer my readers for further details to the article on this subject in the *Medical Record* of July 13, 1912. I might, however, add here a very valuable suggestion made at the recent International Tuberculosis Congress in Rome by Dr. Antonio Stella of New York. It was to the effect that every emigrant should be insured against tuberculosis, the cost of insurance to be added to the price of the steamship ticket, the policy entitling the bearer to return transportation and free treatment in a sanatorium, in the event of his contracting tuberculosis within a specified time.

I hope that through federal control we may obtain fair play regarding tuberculosis immigration from one state into another, and through international agreement, from one country into another, and may thus justly distribute the burden we have to bear and I am sure are willing to bear. The eradication of tuberculosis from our midst is not an easy thing. The greatest of all predisposing causes, poverty, want, bad housing, insufficient food, lack of employment are not new phases of the tuberculosis problem. They confront us at every step, more urgently today than yesterday. They are known to you as they are known to me and they will need attention, for not until there will be more social justice, a more wise understanding and generous fulfilment of our obligations toward our less fortunate brothers and sisters, may we hope for victory over the great white plague. Fortunately, the skies are clearer. Instead of asking "Am I my brother's keeper?" many truly great and noble-minded men and women say "We must be our brother's keeper." According to the fourth annual statement issued by our National Association, nearly $19,000,000 were spent in the anti-tuberculosis campaign in the United States during the last year.

Thus, it is true, much has been done of late, but there is much more for all of us to do. May our labors be blessed and crowned with success!

[6] "Zur Behandlung der Lungenschwindsucht durch künstlich erzeugten Pneumothorax;" by C. Forlanini; *Deutsche med. Wochenschr.*, 1906, XXXII, p. 1401.

[7] "Dauererfolge bei Behandlung schwerer einseitiger Lungentuberkulose mittelst künstlichen Pneumothorax; by Lucius Spengler; *Munch. med. Wochenschr.*, 1911, LVIII, p. 460.

[8] "Der therapeutische Pneumothorax; by L. Brauer; *Deutsche med. Wochenschr.*, 1906, XXXII, p. 652.

[9] "Ueber die Anwendung des künstlichen Pueumothorax in der Behandlung der Lungentuberkulose;" by C. Saugman; *Zeitschrift f. Tuberculosis*, 1908, XII, Bd. 1.

[10] "Surgery of the Lung;" by J. B. Murphy; *Jour. Am. Med. Assn.*, 1898, XXXI, pp. 151, 208, 281, 341.

[11] "Report of Case of Pulmonary Tuberculosis, Treated with Intrapleural Injections of Nitrogen, with a Consideration of the Pathology of Compression of a Tuberculous Lung;" by A. F. Lemke; *Jour. Am. Med. Assn.*, 1899, XXX, pp. 959, 1023, 1077.

[12] "The Treatment of Pulmonary Tuberculosis by Compression of the Lung;" by Mary E. Lapham; *Amer. Jour. of Med. Sciences*, April 1912.

[13] Artificial Pneumothorax as a Treatment of Pulmonary Tuberculosis;" by Samuel Robinson and Cleaveland Floyd; *Arch. of Internal Med.*, April 1912, Vol. 9, pp. 452–483.

[14] "The Treatment of Pulmonary Tuberculosis by Artificial Pneumothorax, According to the Method of Forlanini;" by G. M. Balboni; Med. Communications of the Massachusetts Medical Society; Vol. XXIII, 1912.

[15] "The Unjustified Prejudice of Tuberculous Patients Against Sanatoria and Hospitals," *Medical Record*. September 28, 1912.

[16] Tuberculosis in Post-Offices and Postmaster General's Order No. 855. Knopf: "Tuberculosis a Preventable and Curable Disease," pp. 18–25.

[17] "Seven Blades Now Where One Grew"; Prof. A. S. Cook, *New York Times*, August 24, 1912.

AN EXPERIMENT IN SCHOOL-ROOM VENTILATION.

FREDERIC BASS.

Read before the Sanitary Engineering Section, American Public Health Association, Washington, D. C., September, 1912.

The literature on the subject of ventilation of enclosed spaces indicates a general agreement amongst investigators and students so far as the mere inclusion of the important factors is concerned, but when the opinions on the quantitative inter-relations of these factors are examined, there is a great divergence and often it is extreme.

The time has arrived when the value of attempting to ventilate school buildings and hospitals *at all* is seriously questioned by many school hygienists and physicians. The fact that the existing conventional ventilating system does not always satisfactorily perform its functions when carefully designed has caused this dissatisfaction. The engineer, however, cannot admit so easily that this problem is insoluble, at least not until all the fundamental physiological principles have been elucidated and the data for truly scientific design is at hand. The gathering of this data may require some years of careful investigation, meanwhile more empirical efforts must be in order. Reflection will indicate that no system of ventilation, especially in school-rooms, will do much to prevent the spread of communicable or other diseases. Direct and intimate contact and proximity, the optimum conditions for infection of one person from another, are far too common and constant both in and out of the room to allow any serious interruption by currents of air moving in any direction whatsoever. The time of travel from one person to another is too short to permit of destruction of pathogenic bacteria by any quality of the air.

Evidently, then, the problem is principally one of physiology and not one of pathology; we aim to maintain a normal body at its greatest efficiency. We can hope to furnish air of the desired quality, in the required quantity at the place where it will be most efficient. .What the best quality or the best condition of the air of a room should be we cannot today be sure. We have the general rule of not less than thirty cubic feet per minute per person as a guide to quantity when the ordinary system of horizontal circua tion is used in connection with a single or double inlet and outlet.

In November, 1911, the University of Minnesota granted to the speaker the sum of $200 to be used in the study of school-room ventilation. For some time the inefficiency of the ordinary system of school-room ventilation had appealed to him; it did not seem reasonable that it should be necessary to furnish for ventilation to each person 100 times as much air as he breathed in a unit of time. It seemed to him that the principle of dilution of air might give way to nature's method of displacement; a method might be devised whereby the entering air would be applied at the point where it would be used, namely, near the face, and then when exhaled taken away, to be used no more.

Such a system would be ideal for investigating the physiological effects of air in various quantities and of various qualities. It should be said here that the great variation in the personal equation of the human subject of experiment makes it desirable to use as many subjects as possible simultaneously in order to get average and usable results. The following paragraphs describe the apparatus used in experiments now in progress at the University of Minnesota.

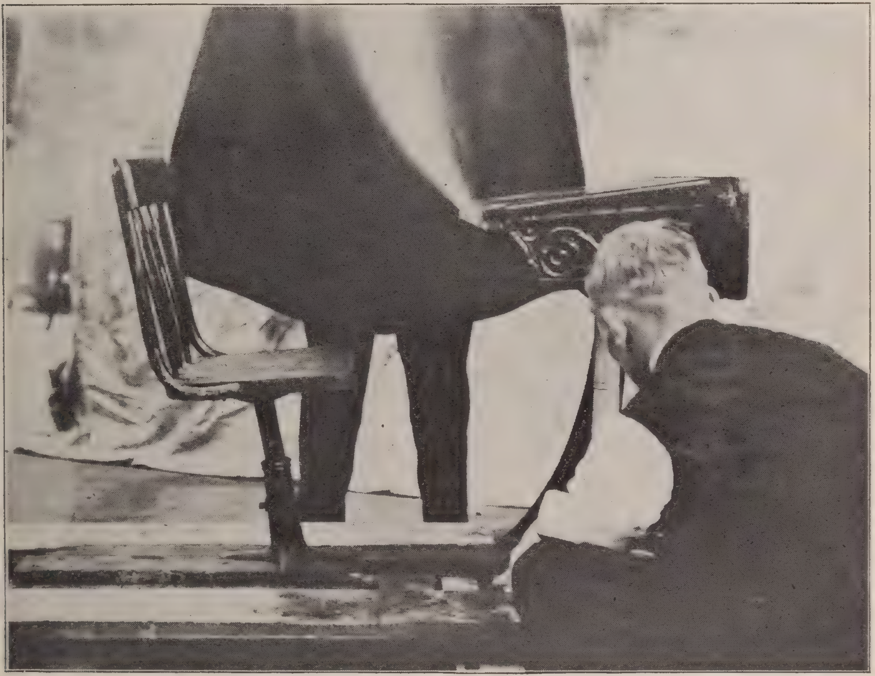

Fig. I.

A school-room on the first floor in the Jackson School at Minneapolis was assigned to the speaker for experimental purposes by the Minneapolis Board of Education. Heating of the room was by direct radiation. The air to be delivered to the pupils in the room was taken in through a window in the basement and passed over two Vento radiators to a Webster air washer and humidifier, thence to a heating coil, from which the air was blown to the outlets in the room by means of a Sirocco blower. The main duct from the blower was carried along the ceiling at one end of the basement room immediately below the room in which the pupils to be subjects of the experiment were located and from it three ducts were extended parallel to the rows of desks. From these ducts, the air was carried through two-inch risers extending through the floor to each desk in the room above, at which points it entered the room through funnel-shaped orifices.

Previous experiment with a single desk and funnel ventilator had shown that with seven cubic feet of air per minute, the head and shoulders of the pupil could be surrounded by air moving at a velocity sufficient to carry away the breath but still not great enough to be objectionable. In this way it was made certain that each pupil would actually receive the air both in quantity and quality that was desirable, and by means of a number of openings in the ceiling, through which the air was drawn by an exhaust fan, it was made equally certain that the exhaled air would be immediately removed from the room.

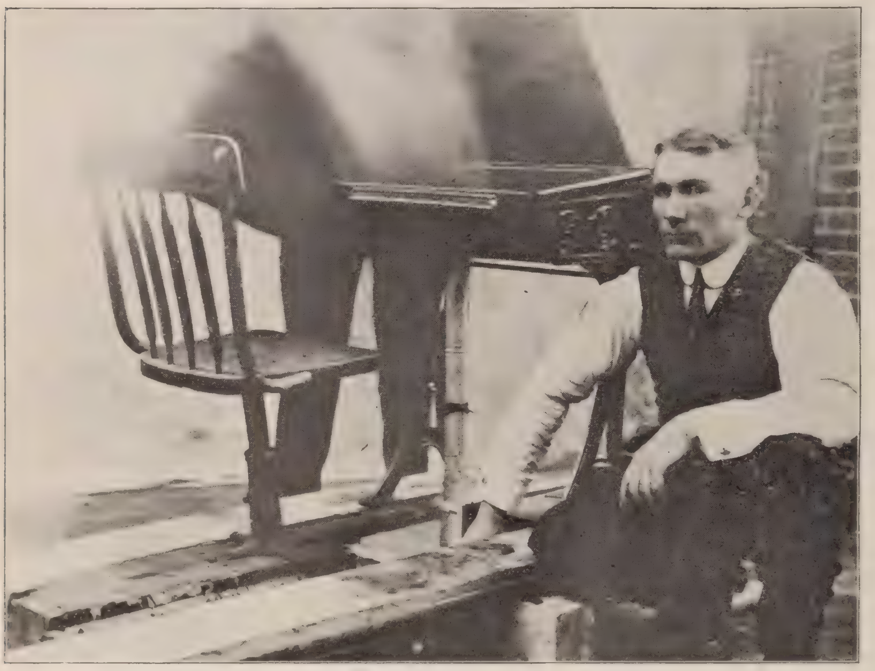

Fig. II.

In the preliminary experiments to determine the best type and location of orifice for admission of air to the room, the first form experimented upon was an elongated orifice or slit in the front edge (the edge nearest the pupil), of the desk. (Figures 1, and 2 show views of this orifice.) The funnel type (shown in Figure 3) gave a much better distribution of air and for other reasons was much better adapted for use in a school-room, and it was accordingly adopted. (Figure 4 shows the school desks themselves with a number of these orifices in position. Figure 5 is a view in the basement room below the room fitted out, and shows the heating coils, washer, blower, regulating devices, as well as the system of pipes used to distribute air to the desks. Figures 6 and 7 are plans of the air distributing and air removal systems, respectively.)

The cumbersome appearance of this apparatus is due to the fact that the washer, blower and heating coils were loaned and it was necessary to use the particular apparatus available, although it was many times larger than necessary. The direct radiation in the room, the temperature of the entering air and the temperature of the water in the air washer were automatically regulated by thermostatic control put in by the Johnson Service Company. The piping and sheet metal work was done by the Waterman-Waterbury Company of Minneapolis. In addition to the above described apparatus, an ozone generator was installed by A. R. Willford of Minneapolis.

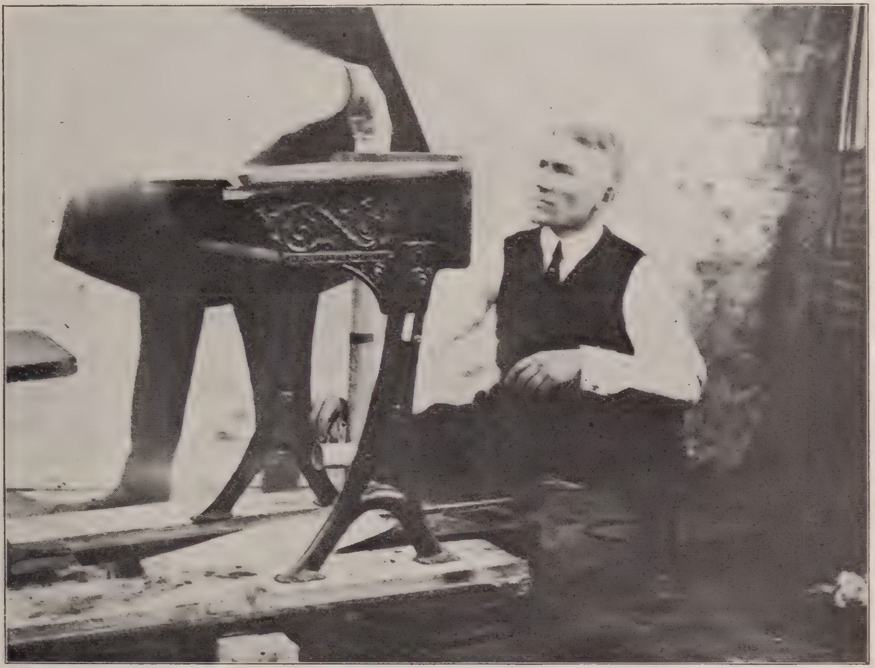

Fig. III.

The plant was kept in operation for about four weeks, and during that

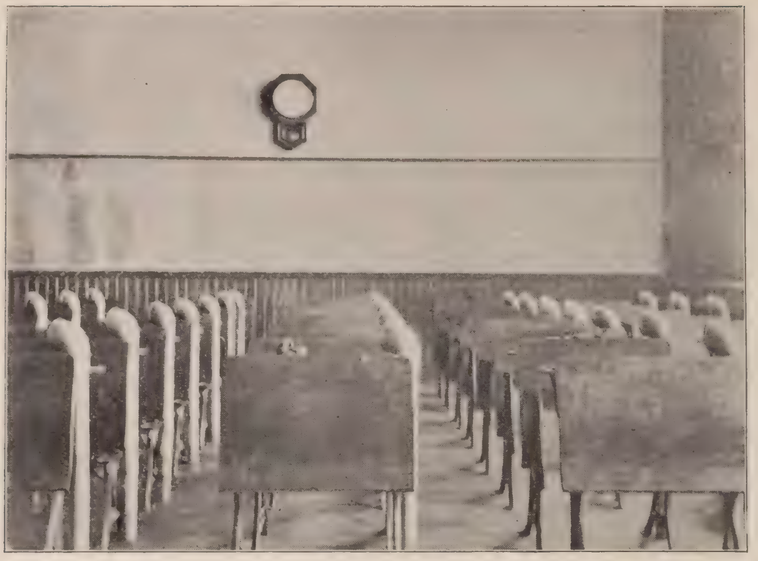

Fig. IV.

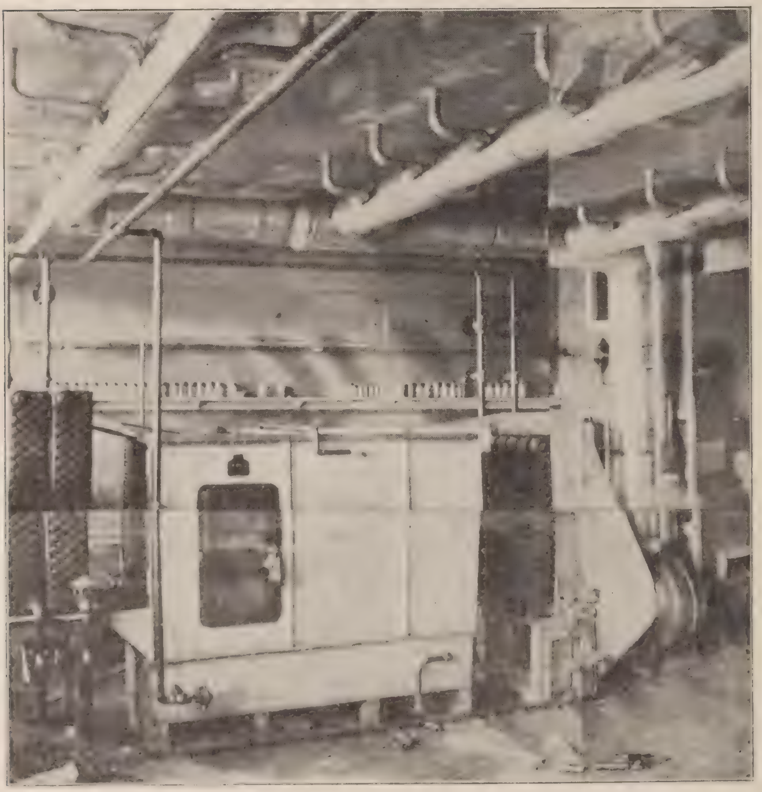

Fig. V.

time it was found possible to ventilate the room satisfactorily, with the crude apparatus installed, with eight cubic feet of air per minute per pupil. During the last few days the ozone apparatus was in operation, and although the cost of the current to operate it was but a few cents per day, a decided "freshening" of the air was noticeable. On four successive days, experiments to determine the mental ability of two selected groups of pupils were carried on by Prof. J. B. Miner, of the University of Minnesota, first under this system and second under the old system of ventilating providing twenty-five cubic feet of air per minute per pupil, but no perceptible difference in mental capacity of the pupils was noticeable. The test, however, was probably unsatisfactory on account of the short duration of the experiments.

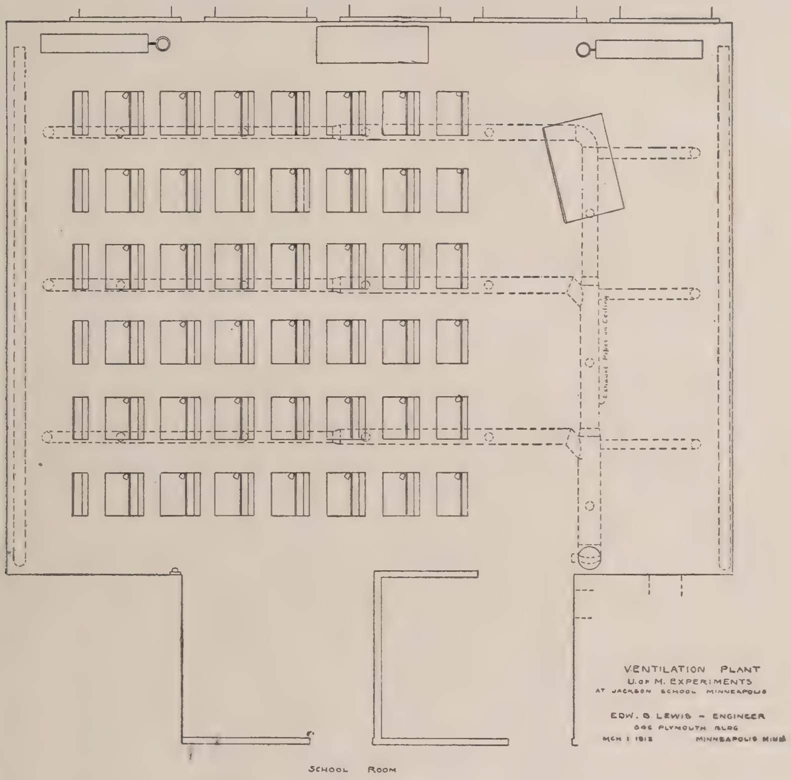

Fig. VI.

There are several mechanical difficulties to be met, such as the heating of the air at the floor level and the prevention of crowding the air all to the rear of the room. The former probably can be met by having air outlets near but not in the floor as well as in the ceiling, the latter by extra inlets in the front desks faced toward the front of the room and also by providing larger outlets at the front.

It is expected during the coming year, with the permission of the Minneapolis Board of Education, to continue the experimental work, which will be mainly physiological. It is intended that this room, together with a similar adjoining room under the ordinary system of fan ventilation as a control, will be in operation. The environment of each child outside of the school building will be carefully recorded. The weight, blood pressure, respiration, pulse and other necessary data will be obtained during a series of experiments lasting several months, and it is hoped that some connection between the physiological condition of a school child and the quality and quantity of air which he receives may be determined. The apparatus which has been described and which has been in use for over a month, has shown conclusively that eight, and perhaps as low as six, cubic feet of ozonized air per minute per pupil will be sufficient for ventilation when it is properly distributed.

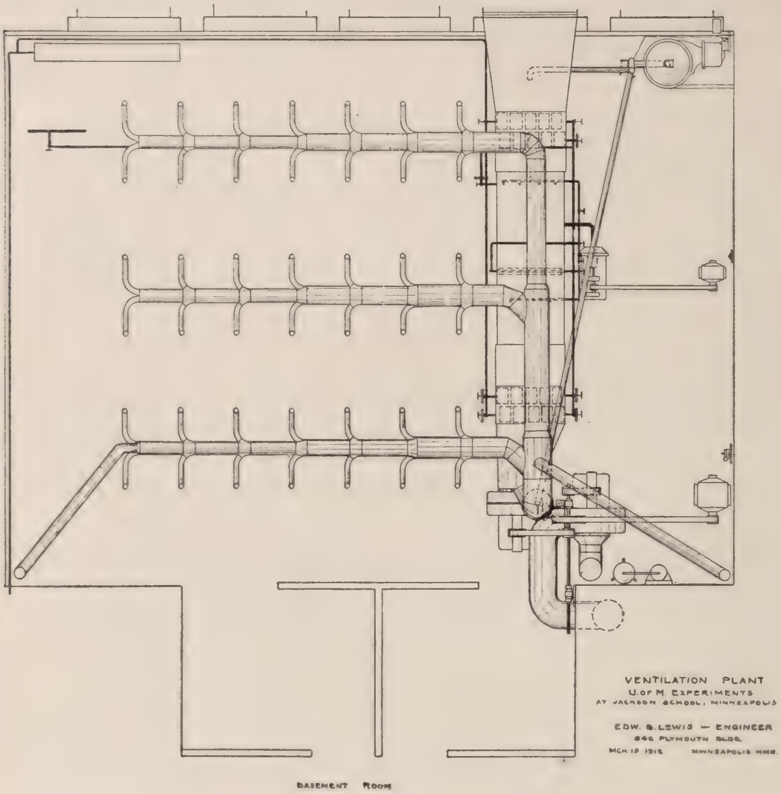

Fig. VII.

The cost of installation of such a system in a new building equipped with the new type of hollow standard desks acting as risers and with a modified funnel outlet, should not exceed that of the present ordinary systems when the diminished size of main ducts, fans and engines or motors is considered.

AN OUTBREAK OF TYPHOID IN BELLEVILLE, ILLINOIS.

HORATIO N. PARKER,
University of Illinois.

About the middle of March, 1912, Dr. B. H. Portuondo, health officer of Belleville, requested B. R. Rickards, who was then chief of the Department of Municipal and Sanitary Dairying of the University of Illinois, to look into the typhoid situation in Belleville, a city of 21,100. Professor Rickards detailed the writer to the city and gave him charge of the investigation.

In conference with Doctor Portuondo it was found that he had collected data in a sufficient number of cases to make him suspect that the infection was spread by the milk of dairy "A," and he further suspected that the cause of the trouble was a carrier, for the dairyman's wife, some months before, had been discharged from a local hospital as cured of typhoid fever, but other factors were pointed out as possibly being the cause of the epidemic. This preliminary investigation was most helpful inasmuch as in but few places in Illinois is typhoid fever a reportable disease, and so it often happens that the local health authorities have no idea of the degree of its prevalence, consequently it is slow work to get at the facts.

In Belleville the gathering of further evidence was greatly facilitated by the hearty coöperation of the physicians and hospital authorities. As the facts accumulated it became evident that certain factors suspected of being operative were not so and that all signs pointed toward the dairy. Here are the main facts:

In the latter part of April, 1911, some cases of typhoid fever appeared in the neighborhood of dairy "A." Some of the patients were customers of the dairy, but at this late date it is impossible to tell whether or no they contracted the fever from the milk supplied by the dairy. One of the earliest cases of which trace was obtained was that of Mrs. A who came down with the disease about May first and who was in one of the local hospitals from May 22 to June 12. On A's milk route there occurred in June four (4) cases of typhoid fever that, perhaps, were contracted from A's milk, but they might have had some other origin.

The record compiled in March, 1912, by careful inquiry amongst the practicing physicians and hospitals, showed eighty-eight cases distributed as follows:

JULY 25, 1911-MARCH 26, 1912.

	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Cases.	2	2	2	1	6	5	5	24	41
Percentage supplied with milk by "A".........	50	50	0	100	100	60[a]	100	83[b]	80[c]

[a] 100 per cent. if customers of dairymen known to have purchased milk from A are included.

[b] 96 per cent. if customers of dairymen known to have purchased milk from A are included.

[c] 83 per cent. if customers of dairymen known to have purchased milk from A are included.

Besides these cases there was one which was contracted out of the city.

Too much confidence should not be placed in the completeness of the record of the first four (4) months, for it may be that more thorough search would have discovered other cases.

These eighty-eight cases were distributed on several milk routes as follows:

Dairy.	Cases.	Percentage of Total Number of Cases.
A..	70	79.5
B..	4	4.5
C..	2	2.3
D..	3	3.4
E..	2	2.3
F..	1	1.1
G..	1	1.1
H..	1	1.1
Condensed Milk..............................	1	1.1
Own cow..	2	2.3
Unknown..	1	1.1
	88	99.8

Of the seventy cases on A's route, fifty-four, or seventy-seven per cent., were certainly primary cases. The other sixteen cases may have been either secondary cases, due to contact, or primary cases from the milk. All of the cases on the other milk routes were primary. Dairymen B and C stated that they bought milk at different times of Dairyman A to make up the full quantity of milk needed for their routes. So seventy-six cases, or 86.3 per cent. of the total number of cases, may have had A's milk.

Dairyman A stated that once or twice he had sold milk to Dairyman D but this was denied by D. It is not known whether any of the other dairymen purchased milk of A or not. One of the cases, where the patient had milk from his own cow, was in all probability a contact infection for the patient was nursing typhoid cases in one of the hospitals. It is interesting to know that much of the milk was cooked because many of the people were German-Americans and were accustomed to heat or, as it was said, boil their milk, and because before the epidemic was over Doctor Portuondo advised the boiling of milk. Evidently it either was not heated to a temperature high enough to kill the germs or it was returned to the original container where it was reinfected.

The distribution of cases, as regards sex and age, is set forth in the table on page 489.

The facts brought out by the table (page 489) may be summarized as follows:

	Cases.	Percentage of Total Cases.	Deaths.	Percentage of each sex and of Total Cases.
Male	35	39.8	0	0.0
Female	49	55.7	5	10.2
Sex Unknown	4	4.5	1	25.0
Total	88	100.0	....	6.8

Of the six (6) deaths three (3) were on A's route, one was on B's route, one on C's, and the dairymen who served the other decedent is unknown. B and C are known to have purchased milk from A.

Dairy "A" in the middle of March had about 150 customers. It was located at the southern edge of the city in a populous district. An inspection of the premises showed the barn to be a fairly built inexpensive structure that was well cared for but which was surrounded by a number of insanitary privies. The herd was not properly looked after for the flanks of many of the cows were caked with dirt. The milk house which was between the barn and the dwelling was immaculate and it was evident that great pains were taken to keep utensils, cloths, etc., clean. Milk was peddled from a wagon in which it was carried in two cans from which it was drawn into a measure by a faucet at the bottom of the cans. It was stated that the milk and utensils were cared for almost wholly by Mrs. X

	Cases.	Percentage of Total Cases.	Deaths.	Percentage of Mortality.
0–5 years			0	0.0
Male	5	5.7		
Female	4	4.5		
Sex unknown	1	1.1		
6–10 years			0	0.0
Male	10	11.4		
Female	8	9.1		
11–15 years			1	9.0
Male	5	5.7		
Female	6	6.8		
16–20 years			3	15.8
Male	4	4.5		
Female	14	15.9		
Sex unknown	1	1.1		
21–30 years			0	0.0
Male	8	9.1		
Female	9	10.2		
31–40 years			1	16.6
Male	2	2.3		
Female	4	4.5		
41–50 years			1	25.0
Male	0	0.0		
Female	3	3.4		
Sex unknown	1	1.1		
51–60 years			0	0.0
Male	1	1.1		
Female	0	0.0		
Age Unknown			0	0.0
Male	0	0.0		
Female	1	1.1		
Sex Unknown	1	1.1	0	0.0
	88	99.7	6	

who was occasionally helped by the maid, and that Mrs. A only rarely helped with the milk and utensils. While this undoubtedly was the honest belief of the family it seemed that Mrs. A might have more to do with the milk than was realized for at the kitchen sink there was opportunity to handle things that went into the milk house.

Blood samples were taken from Mrs. A, Mr. A, the maid and two male employees; of these the only one that gave a positive Widal test was that from Mrs. A.

Specimens of urine and feces were taken from Mrs. A and from Mrs. X. The urines showed no suspicious organisms, and the finding on the feces of Mrs. X was negative. The feces of Mrs. A showed actively motile bacilli that produced no gas and no decolorization in neutral red agar, had a faint colorless growth on potato, failed to coagulate milk, produced acid and no gas in dextrose broth, produced no gas in lactose broth, none in mannite broth and which gave a positive macroscopic test from which it was concluded that Mrs. A was a carrier.

The organisms were isolated by emulsifying one loop full of feces in 10 c. c. of sugar free broth and incubating the emulsion at 37° for one (1) hour previous to the inoculation of the plates.*

Previously prepared plates of Endo's medium were inoculated from the emulsion with a bent glass rod and were then incubated 15 to 24 hours at 37°. Suspicious colonies were then fished from the plates and by streak and puncture inoculated on slants of Russell's medium.† The slants were then incubated 8 to 18 hours.

The macroscopic test was applied by Martin Dupray; the rest of the bacteriological work was done in the Laboratory of Municipal and Sanitary Dairying of the University of Illinois.

CONCLUSIONS.

The important lessons that may be learned from the epidemic are:

1. Once more it is shown to be dangerous to permit anyone who has recovered from typhoid fever to engage in the dairy business or in the purveying of other foods unless it has been determined that he is not a bacilli carrier.

2. The necessity of making typhoid fever a reportable disease is emphasized. It seems certain that the Belleville epidemic would have been checked earlier had it been sooner known that the disease was unduly prevalent amongst the customers of the milk route involved.

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* "The Rapid Isolation of Typhoid, Paratyphoid and Dysentery Bacilli" by Arthur I. Kendall and Alexander A. Day. *The Journal of Medical Research*, Vol. 25, p. 97, September, 1911.

† "The Isolation of Typhoid Bacilli from Urine and Feces with a Description of a New Double Sugar Tube Medium." F. F. Russell, *The Journal of Medical Research*, Vol. 25, No. 1, pp. 217-229, September, 1911.

3. Ignorance of the ways in which typhoid fever is spread is responsible for the disease getting into many communities. In this case no blame can rightfully be placed on anyone for the outbreak. At the time Mrs. A was discharged from the hospital knowledge of carriers was not so widely disseminated as it now is. Dairyman A had no reason to suspect his apparently perfectly healthy wife of infecting the milk. The citizens did not know that failure to make typhoid fever a reportable disease would deprive the health officer of information he must have to act intelligently and efficiently.

4. The remedy lies not in drastic laws but in a policy which shall aim at informing the public, as rapidly as possible, of the basic principles of preventive medicine.

METHODS FOR THE ERADICATION OF HOOKWORM DISEASE.

JNO. A. FERRELL, M.D.,
North Carolina State Board of Health, Raleigh, N.C.

Read before the General Sessions, American Public Health Association, Washington, D.C., September, 1912.

Hookworm disease may be eradicated by the effective application of simple methods, preventive or curative. Its eradication by preventive means is dependent upon the installation and uniform use of sanitary privies by all the people in infected areas. The curative method is based upon the successful treatment of every infected person. In a democracy the application of either method is dependent on teaching the people. The most apt method of teaching is by demonstration. The best demonstration of the disease and its importance is a cured person. Hence, the method thus far pursued in the South though general to a certain degree has been featured by curing sufferers.

The treating has been done by the general practitioners and by whole-time health officers representing the State Boards of Health and the Rockefeller Commission conjointly. The former numbering about 21,244 physicians have reported 68,377 treated cases up to June 30. The latter numbering fifty physicians in ten Southern States have treated, during the one and one-half years preceding June 30, 154,956 persons, making a total of 223,133 people treated. The 154,956 persons treated for demonstrative purposes have been reached by the campaign forces through state and county dispensaries for the free examination and treatment for the disease of all applicants. The same general plan for the dispensary work is followed throughout the South and was first used by the Porto Rican Anemia Commission.

The county is the unit for the dispensary work. It is conducted by a physician representing the State Board of Health. He begins the work by securing from the Board of County Commissioners a small appropriation of two hundred or three hundred dollars to defray the local expenses occasioned by the publicity work, cost for thymol, and traveling expenses of the microscopist who is his assistant.

The commissioners in making the appropriation designate five places in the county as dispensary points each of which, on a stated day of the week, have a dispensary for the four to eight weeks duration of the county campaign.

The work of the commissioners completed, the director sets about to secure a large attendance on the various dispensaries. By personal visit or letter he seeks and usually obtains the active coöperation of the doctors, teachers, editors and two hundred or more of the leading citizens of the county.

In addition the county is flooded with newspaper announcements, posters, and handbills giving information relative to the itinerary, the bringing in of specimens of feces, etc. The crowd assembling on the first dispensary day represents usually the better element. It witnesses the use of the microscope, the collections of intestinal parasites, an exhibit of photographs of uncured and cured patients, charts, literature, etc., and much interest is aroused from the beginning. Each successive week finds the crowds increasing in size bringing back again and again those found infected until cures are made. The examination of anywhere from fifty to four hundred people daily is customary, all examinations being based on the microscopic recognition of the ova in the feces.

The county appropriation is of the utmost importance as it is an official announcement that hookworm disease is recognized as such a menace to life, health, happiness and useful citizenship that a special appropriation by the county for combating it is warranted. The wisdom of the investment is so promptly apparent that in North Carolina (my state) where fifty-three counties have appropriated more than $12,500 for this work I am yet to hear the first criticism from the most partizan or the most miserly citizen.

The results of treatment in many cases are truly marvelous. A gain of a pound daily is common. Patients brought in on stretchers have been restored to normal health in a few weeks at a cost of only a few cents. The witnessing by the people in all sections of the county of the transformation from invalidism, blighted ambition, misery, and poverty to health, happiness and productive activity does the teaching which excites them to action not only to cure the sufferers, but also to throw about all the people the needed sanitary protection. There is now seldom found skepticism or a lack of coöperation among the doctors, teachers, editors, officials, or others in those counties where the work has been conducted.

The installation and use of sanitary privies do not give to the layman apparant and speedy results yet it calls for an investment of several dollars for each family. This phase of the work, therefore, though progressing steadily has not yet made sufficient headway in rural districts to eradicate the disease by preventive measures. We trust, however, that contemplated measures for more rapid progress in this phase of the campaign will soon make it rival the gratifying progress being made in treating the disease.

BOOK REVIEWS.

Prevention and Control of Disease. *By Francis Ramaley, Ph.D. Professor of Biology in the University of Colorado, and Clay E. Giffin, B.A., M.D., Instructor in Surgery in the University of Colorado. Published in Boulder, Colorado,* 1913. *Cloth* 4°, 386 *Pages,* $3.00.

All those who have had practical experience in public health administration will be able to testify to the great aid and encouragement which they have received from the educated layman. Significant of the spirit of the times, is the large number of articles and books published dealing with public health subjects for the laity. The latest addition to this literature is the excellent book before us. In its twenty-five chapters it presents the lay reader with a concise, readable and generally accurate account of the cause and mode of transmission of the infectious diseases, with the mechanism of immunity and with the best methods of preventing these diseases. In order to do this logically and understandingly, the authors begin with a chapter on death-rates and disease prevention in general, and a discussion of various types of diseases and certain hygienic considerations. Then follow brief but adequate presentations of the germ theory of disease and other theories, a description of the life of microörganisms, plant and animal parasites, and microörganisms in air, water, and food. This brings the reader to infection and the spread of disease, and to disinfectants and their action. Two chapters are devoted to susceptibility, resistance, and immunity, and one to specifics in the treatment of disease. With this foundation the reader is prepared to enter upon the more special portion of the book, taking up first the subject of colds and their like, then typical filth diseases, and special types of filth diseases. After this come, in order, smallpox and vaccination, wound infections, diphtheria and pneumonia, contagious diseases of childhood, and three chapters on tuberculosis. The book closes with chapters on yellow fever and malaria, cancers and diseases of the second half of life. All the material is well chosen and exceedingly well presented, and though now and then we hold somewhat different views concerning the common mode of transmission of certain of the diseases, we heartily commend the book as a safe guide to the lay public. Here and there an error has crept in. Thus on page 302, the author states that the hay bacillus resembles the tubercle bacillus. Of course, he means the timothy grass bacillus. On page 307, Park is cited as authority for the statement that lesions in man due to the bovine form of tubercle bacillus are not less than 10 per cent. of those due to the human type. This is manifestly an error. In the discussion of measles, Goldberger's work is entirely overlooked, and the chapter on yellow fever takes absolutely no account of the interesting discoveries of the past few years. We should have liked to see much less emphasis placed on fomites as vehicles of infection, and contrariwise, much more on direct infection from the patient or from carriers. We find no mention of carriers in the discussion of cholera; in the excellent chapter on hookworm it would be well to include the term "ground itch"; in that on syphilis the term "chancre" is omitted, though the initial lesion is mentioned. In discussing milk-borne tubercle infection, the authors fail to mention pasteurization as the great preventive, and speak merely of barring from dairy employment all persons suffering from tuberculosis. It is evident that this will do nothing to prevent infections of bovine origin. The reviewer also feels that the rôle of flies in the spread of tuberculosis is very much less than one would believe after reading page 319. Flies undoubtedly do carry infectious diseases, notably the diarrhœal diseases and typhoid fever, but it must not be forgotten that the bacteria of these diseases are capable of great multiplication in milk and other foods.

The criticisms here made are but minor blemishes in an exceedingly well-conceived and well-written book, and can easily be corrected in another edition. Meantime it would be well if this book could be widely read by the general educated public, for it gives a vast amount of accurate information and wholesome advice.

Charles F. Boldnan, M.D.

Transactions of the Third Annual Meeting of the American Association for the Study and Prevention of Infant Mortality. *Cleveland, Ohio, October 2–5, 1912. pp. 383, American Association for the Study and Prevention of Infant Mortality, Baltimore, Md., 1913.*

This volume, recently distributed among its members by the American Association for the Study and Prevention of Infant Mortality, presents in systematic and attractive style the forty or more addresses and committee reports heard at the Association's meeting in October. The convention was opened by an address of welcome from the Hon. Newton D. Baker, mayor of Cleveland, after which the president of the Association, Dr. Cressy L. Wilbur, reviewed some of the more urgently needed measures for the prevention of infant mortality in the United States. Doctor Wilbur emphasized the necessity for improved vital statistics, for maternal nursing, for pasteurization " of all doubtful milk," for the control of midwives, etc.

Following the general sessions, special section meetings were held, in which the several committees of the organization made their reports, accompanied by addresses on allied subjects. The phases of the problem to which these " section meetings " devoted their special attention correspond to the subcommittees through which the work of the Association is carried on, and may be indicated by the following headings:

1. Birth Registration.
2. Continuation Schools (Education).
3. Eugenics.
4. Progress in Preventive Work.
5. Midwifery.
6. Housing.
7. Nursing and Social Work.

It is impossible to attempt to discuss the many admirable papers presented to these committees. The conference on eugenics was particularly rich in valuable contributions made in the addresses of such authorities on this subject as Prof. H. E. Jordan, Dr. Henry H. Goddard, and others. In the birth registration section Dr. William H. Davis of Boston presented the results of an exceedingly interesting study into the relation of stillbirths to nationality, occupation and economic conditions among the various classes of the population of Boston.

Before the section on continuation schools it was proposed by several speakers to utilize these educational agencies for the instruction of men and boys in domestic economy and home-making. If such measures are intended to fit men for the home, while their wives make shoes and cotton cloth in the factories it will seem to many that the proposal, if applied, would act as an unfortunate palliative, while what is needed is cure through economic readjustment. However, an enhanced sense of duty toward the home on the part of the male members of the family is highly desirable, as is also the better comprehension, on their part, of the problems of home economics.

The report contains the constitution and by-laws of the Association, a membership list, and list of affiliated societies. The names of the Association's officers are given, together with the lists of directors, committee members, etc. Dr. Emmett Holt of New York City is the president of the Association for 1912–1913. It is announced that the fourth annual meeting will be held in Kansas City, Mo., October 23–25, 1913.

Donald B. Armstrong, A.M., M.D.

HEALTH DEPARTMENT REPORTS AND NOTES.

TO STATE AND MUNICIPAL HEALTH OFFICERS.

This new division of the Journal is specially designed to be of use to active Health Officers of the countries represented in the American Public Health Association. It will be unable to serve its true function unless the Health Officers are willing to coöperate by sending to the Journal copies of their reports, bulletins, new ordinances and personal information which will be of general interest. Furthermore it would be distinctly desirable if communications on subjects of general interest are submitted for publication in this division of the Journal. The management will further welcome any suggestions from Health Officers for the improvement of this division. All communications should be addressed to Selskar M. Gunn, Managing Editor, American Journal of Public Health, 755 Boylston St., Boston, Mass.

REPORTS.

Los Angeles, Cal.

During the fiscal year ending June 30, 1912, there were reported 5,267 deaths, giving a death rate of 15.05 on an estimated population 350,000. It seems to be more desirable to have the morbidity and mortality statistics extend from January 1 to December 31, even if the financial year ends June 30.

The population of Los Angeles has increased during the last decade more than threefold; in 1901 being 102,000 and in 1911, 350,000. The need for a sanatorium for the care and treatment of cases of tuberculosis is pointed out. The only accommodation for curable cases who are unable to pay is at the Barlow Sanitarium which is limited to a capacity of four beds. The need for more tuberculosis nurses is also well indicated, there being only one at the present time.

The health officer, Doctor L. M. Powers, also states that, "There should be a crew of scrub women in connection with the fumigation department who should scrub walls and floors for those unable or unwilling to renovate infected rooms."

One hundred and seven cases of smallpox were reported with eight deaths, which is the most extensive and most fatal epidemic since 1899. In this connection it is interesting to note that virulent smallpox was introduced presumably from Old Mexico and there were present at one time in the city two forms of smallpox, the virulent and the mild form, well demonstrating the differences in virulency in different epidemics of this disease.

Scarlet fever was prevalent during the year and 540 cases were reported. However, only six of these ended fatally, giving a fatality percentage of 1.1. Two hundred and fifty cases of typhoid fever were reported with forty-three deaths. The report states that the great majority of cases received the infection from outside sources. In referring to whooping cough, of which there were 452 cases reported with 15 deaths, Doctor Powers has the following to say with regard to its control: "The difficulty of ascertaining whether a child has entirely recovered or not, together with the well-known fact that fresh air and an outdoor life are so highly essential in the treatment, speaks rather strongly against quarantine, consequently, while the children are excluded from school and every effort made to keep them from attending public places, the houses are not quarantined."

Eighty-three cases of trachoma, a disease which was unknown in the city a few years ago, were reported.

The report of the city chemist, Mr. Erwin H. Miller, brings out the interesting point that there are two milk standards, the city standard and the state standard. Twenty-two per cent. of the samples were below the city standard and 10 per cent. below the state standard. The standards themselves are not indicated.

Doctor R. B. Durfee, the city bacteriologist, reports that of the 402 milk samples examined bacteriologically, only 29 were above the limit. Here again the legal limit is not indicated.

The report of Mr. George H. Hart, the chief milk inspector, gives indications of very considerable activities. The total supply is produced on 1,461 dairies and the daily consumption approximates 35,074 gallons of milk which come from nearly 23,000 cows. The average score of the wholesale dairies was 48.58 per cent. and of the retail dairies, 51.4. It is stated that the use of the scorecard system, which has been carried on since January, 1911, has not succeeded in raising the standard of the dairies as much as it should have done. The reason for this is accounted for by the fact that the authorities have not set a minimum standard to score below which a dairy would be excluded. The fight over the tuberculin test is referred to. The city council in November, 1911, passed a Tuberculin Test Ordinance which provided that all cows supplying milk to the city would have to be tested by the Health Department without any charge to the dairymen. The milk from reacting animals was to be admitted to market for three years provided it was properly pasteurized. The dairymen organized against this ordinance and started a referendum petition concerning it. Mr. Hart states that "By a misrepresentation of facts, these petition circulators succeeded in getting enough qualified voters to sign the petition to hold up the enforcement of the ordinance until it had been submitted to a popular vote of the people.

"This election was held May 28, 1912, and the ordinance was defeated by a majority of 5,000 votes. Money to conduct the campaign was generously contributed by the opposition and their campaign of misrepresentation so moulded the previously uninformed public mind against the tuberculin test that it was impossible for the Health Department without funds and with the assistance of a comparatively few private citizens to get the truth properly before the people.

"By the defeat of this ordinance Los Angeles has taken a long step backward in the improvement of its milk supply."

The loss of time of milk inspectors in going from place to place is emphasized and it is stated that it would be an economical step on the part of the city to allow the milk inspectors $125 per month (they now get $110) with the understanding that they provide themselves with automobiles, which they are willing to do.

Mr. J. R. Caldwell, the bakery inspector, states that "The delivery of bread to homes and stores is now done in a more sanitary manner, most of the producers wrapping their bread in an oiled, moist-proof and dust-proof paper, which also prevents the attack from flies while the bread is in transit from baker to consumer. This also prevents soiled hands of drivers, grocery men, etc., from coming in contact with the bread."

Reports of school inspection, nurses, and chief sanitary inspectors are also given. The total expenditures amounted to approximately $90,000, of this $72,600 was for salaries. The actual salaries given to the various officials are not enumerated.

This is an interesting and instructive report and gives evidence of efficiency on the part of the Health Department.

Toledo, Ohio.

One of the most important items of information in the annual report of the Board of Health of this city is the announcement of the establishment of a Chemical and Bacteriological Laboratory. Toledo, with a population of over 170,000, is apparently one of the last of the larger cities of the country to establish such a laboratory.

Doctor B. Becker, health officer, in discussing the appropriation of the Health Department gives the following information:

"The tax levy for our department in 1903 was .35 mills; 1904, .30 mills, and in 1908, .20 mills, and has since remained at the latter figure until 1912, when the levy was fixed at .125 mills. The last named figure will bring in about $25,000. This sum gives us about 14 cents per capita on the estimated population, to be spent for the health of the citizens of the city of Toledo; Cleveland spends 30 cents for the same purpose; Cincinnati, 23¼ cents; Columbus 23 cents, and Buffalo just now is endeavoring to get an appropriation of $1 per capita, and in the other named cities the Health Departments are asking for increased funds."

The need for a proper recognition of the importance of the Health Department on the part of the city council is well indicated. The estimated population for 1911 is given at 172,899. The death rate for the year, including non-residents, was 14.93, and excluding non-resident deaths at the state hospital, 12.75. There were 39 deaths from typhoid fever as compared with 63 in 1910. The Health Officer states that "Under usual conditions it seems to be agreed that a death rate from typhoid fever of 10 to the 100,000 of the population may be justified." Just what the justification is, is not indicated. The vast majority of the typhoid fever cases reported were found to occur in houses which were supplied with water from surface wells, which in most instances were found to be contaminated.

The health officer points out that the Police and Fire Departments are enjoying the benefits of pensions and is of the opinion that a pension fund for the sanitary officers would be proper and timely.

There are appended to the health officer's report, the reports of various divisions of the department. The report contains no financial statement. On page 23, there is given a "Comparative Mortuary Table from 1880 to 1911." The death rate per thousand is given in various forms; for example, in 1898, 10.332 pl.; 1900, 12.31⅓; 1904, 11.348; 1908. 11.2028. Just why these figures are given in such extraordinary variable ways is not indicated.

Buffalo, N. Y.

Dr. Francis E. Fronczak starts out his report with the statement that the death rate for Buffalo for 1911 was 14.35 and that this is perhaps the best proof of the efficiency of the Department of Health.

In referring to the subject of infant mortality, Doctor Fronczak writes as follows:

"Many of the young mothers are absolutely ignorant of the fundamental principles of rearing a child. We study the various breeds of animals, we try to improve fruit and grain, we teach the farmer how to look after his product, and yet very little is done in reference to teaching mothers of children. A 'School for Mothers' is imperative, where prospective mothers and those who have already given birth may be taught how to look after their offspring. It is absolutely necessary that immediate steps be taken with this important subject."

The pressing need for a hospital for advanced cases of tuberculosis is well discussed. It is estimated that there are 6,000 people in Buffalo suffering from this disease from which 500 persons succumb during the year. Doctor Fronczak's appeal to the Common Council is worth repeating:

"Can we continue to lose 500 people annually—men and women who otherwise ought to be the very flower of humanity, because we cannot agree on a site for such a hospital, or because the tax rate is liable to be somewhat increased. Philanthropists, scientists, physicians—all who have studied the question—have been pleading with your honorable body for years to build this refuge for poor dying consumptives. For God's sake, how long do you want to continue to be urged? How many thousands more are to be sent to premature graves?"

The health officer refers to the work of the Bureau of Child Hygiene. The department is a very great believer in educating the public and during the past year hundreds of lectures on matters relating to sanitation, prevention of disease, proper foods, ventilation and other subjects have been given. The members of the department most willingly deliver lectures at no additional expense to the city, provided the city will supply lantern slides, films, etc.

Dr. Franklin C. Gram, the registrar of vital statistics, reports 10,546 births, giving a birth rate of 24.22. He urges the adoption by the school department of a rule which would require all pupils on entering school to furnish a birth certificate, and points out that as most pupils enter at about their fifth year, the omission of birth registration would be discovered and could be rectified while the necessary parties thereto were still available.

The report of the Bureau of Child Hygiene is very full and comprehensive, and it is well indicated that this bureau is coöperating with other city departments and private organizations which are interested in the welfare of children.

An interesting report by Dr. William G. Bissell, bacteriologist, on the various methods for purifying water supplies for public schools is given. Dr. Herbert M. Hill, city chemist, made some investigations during the year in the ventilation of school rooms and found bad conditions. He recommends the attachment of an automatic recording gauge to each ventilating fan; the regulation of thermostats on the wall of each room to correspond to a temperature of 68° in the middle of the room; and the installation of hygrometers in each room to show the moisture present. Doctor Hill states that the requirement of a relative humidity of 70 per cent. is too large for so cold a climate as Buffalo and that it would seem better to ask for a moisture content of 40 to 50 per cent. to maintain this all the time during the school sessions.

Reports of the Bureau of Food and Drugs and Sanitation are given which contain much valuable material. All of this report is extremely interesting and leaves one with the very firm belief that the Health Department of Buffalo is adequately performing its duty.

DEPARTMENT NOTES.

A New Precaution against Typhoid Fever.

"At a meeting of the Board of Health of the Department of the City of New York, held March 25, 1913, the following resolution was adopted concerning the provision of privies by contractors and their duties in regard thereto. It was designated as section 37a of the Sanitary Code, and reads as follows:

"'Section 37a. Contractors or builders shall provide or cause to be provided temporary privies for the use of the men employed during construction work, at some convenient place upon the premises, or which shall be readily accessible, and the same shall be properly screened to prevent the entrance of flies thereto. The contents of such privies shall be disinfected and removed and shall not be allowed to accumulate thereat. Contractors, builders or other persons having the management and control of construction work shall prevent the commission of any nuisance by workers, employees or other persons in and about such work or premises connected therewith, and require workers and employees to use the privies so provided.

"'It is hereby made the duty of each

owner or occupant of any premises on which a privy is located or used to cause the same to be properly screened, so that flies shall not have access thereto or to the contents thereof.'"

New York Department of Health, Weekly Bulletin, March 29, 1913.

Venereal Disease Reports.

"Blanks for reporting gonorrhoea and syphilis have been sent to all city health officers and are now being mailed out to village and township health officers. These blanks are similar to the forms used in New York and California. Cases are to be reported by number, symbol or the patient's initials. It is hoped that the physicians will coöperate with the health departments in this work. The problem of handling the venereal diseases has not been solved satisfactorily in any community. It logically rests with the health departments to restrict these diseases and only by coöperation on the part of physicians can it be done. In many instances it will be to the public advantage to report to the local health officer the names and history of certain cases. Full reports are to be made of cases of ophthalmia neonatorum."

Public Health, Michigan State Board of Health, February, 1913.

The Physician and Communicable Diseases in Montclair.

In a recent hand book issued by the Board of Health of Montclair, N. J., the duties and responsibilities of the practicing physician as regards communicable diseases are outlined in the following way:

"He must report in writing to the Board of Health every case of every communicable disease that is brought to his attention, within twelve hours after he is reasonably sure of a diagnosis.

"He must certify that all abnormal discharges have ceased before asking to have a scarlet fever patient released.

"He must exercise the same care to prevent the spread of a communicable disease that he expects the nurse and parents to take.

"A medical inspector must report every case of communicable disease that he sees in the school in the same manner as if it occurred in his private practice."

Household Cleanliness and Yaws.

"We have with us some of the tropical diseases, but not all, thanks be. Yaws, for example. A recent trip to Jamaica emphasizes how grateful we ought to be for that. The disease is quite prevalent there. Not so much in Kingston, but in the poorer suburbs, and in the country. The natives believe they have to have it and make no provision against it. In fact, they treat it like measles—try to get it while they are young and have done with it.

"As a matter of fact they need not have it at all. Few Europeans or Americans, even where the disease is most prevalent, ever contract it. For a while it was not known why, but now it is pretty well understood. The disease is transmitted by bed bugs. Those who live in environments that do not harbor bed bugs don't get yaws.

"It is hard to imagine a more loathsome disease than yaws. It consists of ulcers, which may be sprinkled over the entire body, or may be confined to some particular area. These ulcers may be many or few. At best they last for several weeks, and may last for months or even years.

"They are seen mostly in children, because one attack confers immunity. When children have them and get well, they rarely have the disease a second time. But they are not confined to children. Any age may become infected.

"The eternal lesson taught by this disease is that household cleanliness prevents it."

Florida Health Notes, March, 1913.

Birth Records and Infant Mortality in Tenements.

"The birth records of the Department of Health are not made use of by the Tenement House Department of the city, for the law creating the latter department does not provide for the keeping of records of infants born in tenement houses, although it does provide for the keeping of records of all deaths occurring therein. These latter records are obtained by the Tenement House Department from the Department of Health. Those who are interested in the subject of infant mortality appreciate fully its value as an index of sanitary conditions, and it will, perhaps, surprise them that the Tenement House Department has made no effort to compile data concerning the mortality among infants living in tenements. From studies made by the registrar of the Department of Health, it has been found, as one would expect, that the infant mortality in tenement houses greatly exceeds the infant mortality of the city at large. The latter was found to be about 106, while that of the tenement house section varied between 140 and 300, per 1,000 during 1911. There would seem to be a necessity for a special study of infant mortality in tenement houses for the purpose of making comparisons with that of private dwellings and institutions."

New York Department of Health, Weekly Bulletin, March 29, 1913.

Progress in California.

Dr. W. A. Sawyer in the January, 1913, *Bulletin of the California State Board of Health* has the following to say with regard to progress of the State Board of Health Laboratories made in 1912:

"The year 1912 has been one of notable progress in the laboratory. It saw the beginning of the manufacture of antirabic virus at the laboratory for use by the State Board of Health in administering the Pasteur treatment. It saw the number of laboratories at which the Pasteur treatment for the prevention of rabies is administered increased to eight. It saw a new branch laboratory established at Sacramento for the special purpose of rendering service more promptly to northern California. It saw the number of depositories for mailing outfits for sending specimens and cultures to the laboratory increased to 159. It saw several important investigations of outbreak of disease carried on under the new division of Epidemiology. It saw the beginning of an investigation into the method of transmission of infantile paralysis, and it saw, in this work, the establishment of a precedent for research through which the state will discover and test its methods of limiting and eradicating epidemic diseases."

Rabies in Florida.

An article in *Florida Health Notes* for March, 1913, concludes as follows:

"The conclusion from observed and proven facts warrants the statement that the disease can be stamped out in the state. Once this has been accomplished, it cannot be revived excepting by importation from other states and sections.

"There is just one way to stamp it out, and that is to enforce the laws regarding dogs, for it is perpetuated through dogs. First, insist that every owner of a dog shall pay a license for that dog. Second, insist that every dog allowed to run at large shall be effectively muzzled.

"That's all, excepting to insist that city and town and county authorities charged with the enforcement of these laws shall do their duties or give place to those who will.

"A good many dogs are not worth the license fee, and the license tag should be the permit for every canine to live. If necessary, extend the operation of these laws to cats—and cats are a nuisance in other ways besides this.

"Good lawyers declare that the municipality having such laws is liable for damages resulting from the non-enforcement of these laws. But why wait for such action? Why should such sacrifices be necessary to arouse public sentiment, when an evident danger of such seriousness constantly menaces the people in every community in Florida?"

The State Screen Law.

"Attention of food handling establishments of every description—bakeries, canneries, packing houses, groceries, meat markets, confectioneries, restaurants, hotels, etc.—is hereby called to chapter 473, acts of 1909, section 4, of State Sanitary Food Law, which prescribes:

"'That the doors and windows, other openings of every food-producing or distributing establishment during the fly season shall be fitted with self-closing screen doors and wire window screens of not coarser than 14-mesh wire gauze.'

"The law requires screens to be in place by April 1."

Monthly Bulletin, Department of Health, Chattanooga, Tenn.

What Every One Should Know About Hookworms.

"1. The largest hookworm is only about three-fourths of an inch long—the male a little smaller.

"2. The adult hookworms live in the alimentary tract in human beings.

"3. They lay large numbers of eggs in the alimentary tract.

"4. These eggs are passed out in the stools.

"5. Where sewage is properly disposed of the eggs are destroyed and no harm is done.

"6. But where no privy even is used the eggs are deposited on the ground where they hatch, and

"7. In a few days the baby hookworms are ready to attack the feet of any barefoot child that chances to come along.

"8. This they do by burrowing into the skin, producing what we know as ground itch.

"9. They get through the skin into the circulation, through which they pass till they reach the lungs.

"10. There they are coughed up and swallowed.

"11. When they reach the intestines they grow up to be adult hookworms, and the child begins to get pale.

"12. This child in turn begins to deposit hookworm eggs as the one before him did, and so on in an endless cycle.

"13. If you suspect your child has hookworms write the State Board of Health."

Florida Health Notes, January, 1913.

Wormy Vegetables.

"The first of the new resolutions amends section 42 of the Sanitary Code to include wormy vegetables among foods classified as 'unsound' and forbidden to be offered for sale or sold for food anywhere in New York City. A recent prosecution by the Department of Health, brought under this section of the Sanitary Code in its old form, failed on account of a doubt on the part of the judges as to whether 'wormy' vegetables could be considered unwholesome and unfit for human food. The present amendment of the code should obviate such a contingency in the future by prohibiting the sale of 'wormy' vegetables as such. Nuts, figs, and dates as such or in candy are especially aimed at in this provision, and are for this purpose classed as vegetables. The amended section reads as follows:

"Section 42. No meat, vegetables or milk, not being then healthy, fresh, sound, wholesome or safe for human food or the meat of any animal that died by disease or accident, shall be brought into the City of New York or held, kept, offered for sale, or sold for such food anywhere in said city; nor shall any such food, substance or articles be kept or stored therein. The term 'meat' as herein used shall include fish, birds, eggs and fowl; the term 'vegetables' shall include any product, substance or article used as and for human food other than milk or meat; the term 'not sound' shall include any vegetable that is wormy, and all wormy vegetables, when used or intended for use as herein mentioned, are prohibited. For the purpose of this section, any meat, vegetables or milk in possession of, or held, kept or offered for sale by, a dealer in food, shall *prima facie* be deemed to be held, kept and offered for sale as human food."

Weekly Bulletin, New York Department of Health, February 22, 1913.

Fort Wayne Board of Health.

"In no city can there be found a more active and efficient board of health than in Fort Wayne. Very few of the city boards have felt that they should take up food work although acknowledging it was very important. Terre Haute has done a good deal of work in the way of protecting the people against bad food conditions, and Fort Wayne has certainly done excellently. Dr. Eric A. Crull, health officer of Fort Wayne, got out a certificate of excellence.

"After inspection of a grocery store or food market of any kind, and it is found worthy, a certificate of excellence is given. Said certificate is printed in blue, is six and one-half inches by nine inches, on excellent stiff paper. It bears the red seal of the city Board of Health. Grocers and restaurants who have been awarded these certificates of excellence are very proud of them, displaying them in good frames where customers can see them. This move by the Fort Wayne board is an excellent one, and so far has produced excellent results."

Monthly Bulletin, Indiana State Board of Health, December, 1912.

An Investigation of the Common Fork at the Saloon Free Lunch Counter.

"The sanitary condition of the common fork in use at the saloon free lunch counter, as found in this city, has been investigated by the laboratory of the Louisville Health Department, and the methods employed, the findings and the recommendations are as follows:

"Inquiry shows the frequent use of a food utensil, usually a fork, by the visitors to the free lunches at saloons. This utensil is used to secure portions of food as pickle, cheese, sausage, sauerkraut, etc., as desired by the individual; it is largely used to convey such food to the mouth, after which it is returned to a glass containing some cold water, only to be picked up and used in the same way by succeeding persons. This very personal tool comes, therefore, into more or less intimate contact with the saliva of the mouth and the mucous membrane of the tongue and lips. In view of the fact that we frequently find disease-producing bacteria in the secretion of the mouth and throat, and also on account of the fact that not only diseased people, but also healthy carriers of the seeds of disease are often largely present in a city population, it is important to limit the distribution of disease as much as possible. The following germs would illustrate the possible danger of transmissibility by means of the common fork:

"Syphilis, through sores in the mouth, found most often in the adult; pneumonia germs, found in healthy carriers; the streptococcus, a germ capable of carrying a variety of serious spreading inflammations, *i. e.*, septic sore throat, erysipelas, etc., and a germ that is an important factor complicating many other diseases; the germ of epidemic meningitis, which is found carried in the mouth and throat secretions of many healthy people; the germ of boils and localized inflammation; diphtheria bacillus, tubercle bacillus, etc.

"Sixteen saloons representing the various grades were visited and the material adhering to the fork and a sample of the water bathing the fork were taken for test purposes."

The test methods employed are given in some detail and the article concludes with the following:

"No chemical preservatives were found in the fork water. The animal inoculations made eighteen days ago will require longer time before the full value of that test can be obtained. Streptococci were found in thirteen out of the sixteen specimens examined, By this cursory and preliminary report the common fork shows its contact with the lining of the mouth and the frequent presence of the streptococcus is alone good reason for abolishing the common fork. It is suggested that the food be prepared beforehand in the form of sandwiches, etc., and handed out to the individual, or else each customer be given food on a plate with individual utensils."

Department of Health, Louisville, Ky., February 1, 1913.

Why Births and Deaths Should be Reported.

The reasons why births should be recorded are well epitomized in the *Press Service Bulletin* of the Chicago Department of Health for April, 1913:

"1. That the birth, date of parentage and other essential information for statistical and identification purposes may be collected and officially recorded and preserved.

"2. That the ages of school children may be definitely known, thus aiding in the intelligent enforcement of compulsory school laws.

"3. That laws regulating the employment of children in shops, stores and mills may be enforced and the children of the poor thereby protected.

"4. That all children under the legal age may be prevented from being forced to work in hazardous or dangerous occupations.

"5. That employers who comply with the laws affecting child labor be protetced from the competition of those employers who violate such laws.

"6. That in prosecutions dealing with 'the age of consent' they may be based upon authenticated records, and not determined by guess work and faulty memories.

"7. That, as often happens in the case of deaths, litigation in the matter of inheritance and estates, all matters in dispute may be settled by the easy obtainment of definite knowledge of the ages of all persons interested or affected by the matter at issue.

"8. That the American-born children of foreigh-born parents may have certified evidence of their American birth and thus be able to establish their citizenship when visiting the countries where their parents were born.

"9. That it may be made easy to determine the legal or voting age of all persons seeking to exercise this inalienable right of citizenship.

"10. That blindness may be prevented by prompt medical attention to the infected eyes of the new-born.

"11. That needless sickness and death among both mothers and babies may be prevented by immediate attention by those engaged in organized child welfare work.

"12. That health officials and all those engaged in health and community welfare work may be able to wage an intelligent and effective warfare against the preventable ills of child life and thus bring about higher standards of health and happiness."

What is the Answer?

"If health work saved $5,000,000 in preventable sickness and death in our state last year, will some one please explain why we are afraid to risk over $150,000 in state, county and municipal health work combined to effect a still greater saving when our annual loss from preventable diseases still ranges around $40,000,000? If a business man could save an annual loss of $1 by spending 75 or 80 or even 90 cents, don't you think he would do it? Why, then, is not this great state run on more of a business basis? Why are we afraid to spend over three or four cents to save a dollar?"

Bulletin North Carolina State Board of Health, March 17, 1913.

Coöperation.

"Taking the public into full partnership in the public health enterprise offers tremendous opportunity to the strong man in the health office. The other kind will do well to lie low and attract as little attention to himself and his work as possible."

Bulletin of the Health Department, Asheville, N. C., January, 1913.

Industrial Poisoning Due to Flat Finish Paint.

"This interesting article, in connection with the campaign against occupational diseases, appears in the *Lancet Clinic* and was contributed by Dr. J. H. Landis, health officer of Cincinnati. He outlines some of the symptoms as described by painters using these secretly mixed paints. The fact that during the application of flat finish paints fresh air is excluded from the room only exaggerates the symptoms by increasing the humidity. Some of the men were compelled to discontinue work altogether during rainy weather. Practically all men described the following symptoms: dizziness, severe frontal headache and a feeling of "dopiness," defective vision, and in one case almost complete loss of vision for a short time resulted. The eyes burn, conjuntiva is red, lids are swollen and there is lacrimation. In some a cough develops. Loss of appetite is a constant symptom. Constipation occurs in about 50 per cent. of cases. About the third day vomiting occurs. When turpentine is used in paint this does not occur. Steady continuous pain in the abdomen under short ribs is a pretty constant symptom. The kidneys and urine are effected in some cases. One man was rejected for life insurance on account of albuminuria, due to the effect of his kidneys.

The men tried various combinations of turpentine, oil, benzine, gasoline, coal oil and japan. None of these combinations produced the symptoms described. Several men were of the opinion that an oil sold by distillers and used in the manufacture of paint might be the cause. Lead is not contained in these paints, so is excluded as a cause. Wood alcohol is suggested by the eye symptoms. Amylacetate was considered, but odor was not suggestive of this. The matter has been placed in the hands of Dr. Alice Hamilton, government expert on lead poisoning, for further investigation. Physicians who encounter this form of poisoning are requested by the writer to furnish any information that they may have obtained in treating cases."

Ohio State Board of Health, February, 1913.

PERSONAL.

Honor to Whom Honor is Due.

"It too often happens in our work-a-day life that men, who have been pioneers in a good cause do not receive the praise to which their far-seeing vision and achievements entitle them until they have passed out of this life. The doctors of Wake County do not defer to put on record their appreciation while their distinguished associate is still alive and an active leader in a good cause of which he was a pioneer, and so at a recent meeting of the Wake County Medical Society passed a resolution containing a singularly appropriate and discriminating appreciation of the services of Dr. Richard H. Lewis has rendered in behalf of public health and high standard of the medical profession in North Carolina as secretary of the State Board of Health from the time it was organized in 1877 until he resigned in 1909. With meagre support and lack of knowledge by most people of the laws of health and sanitation, Doctor Lewis was, indeed, as the resolution says, "a benefactor to his day and generation." The late Governor Aycock declared that Doctor Lewis was "distinguished for prudence in dealing with the legislative committees, persuasive of speech, always in thorough control of himself, always dependable, careful in framing laws and explaining them, and withal a great patriot and wise counselor." These qualities have not only given Doctor Lewis his position in his native state, but his worth as a man and leader in his professsion has been recognized in the Republic as well as in the state, for he has not only been president of the North Carolina State Medical Society but he has been president of the National Conference of State and Provincial Boards of Health and president of the American Public Health Association.

Editorial, News and Observer, January 28, 1913.

PUBLIC HEALTH NOTES.

An Important Conference.

A meeting of great interest to the members of the American Public Health Association was held in New York City on April 12 at the call of the Council on Health and Public Instruction of the American Medical Association. Dr. Frederick R. Green, the secretary of this council, had previously canvassed the executive secretaries of the most important organizations interested in public health work and many of its phases as to the desirability of there being a conference to take up the general questions of the possible dangers of duplication of effort and expense and to find out whether or not a closer co-operation between the various organizations might be of value.

Mr. John M. Glenn, Director of the Russell Sage Foundation, was elected Chairman of the meeting, and Mr. John B. Andrews, Secretary of the Association for Labor Legislation, Secretary.

The *Survey* for April 26, epitomizes the subjects discussed as follows:

"1. A central national health organization, composed of one representative (perhaps the executive officer) from each of the fifty-odd national health organizations in the United States.

"2. An annual conference of this central organization in January, at which might be discussed one topic of paramount importance in the health field, to the end that the work of the central organization during the year be centered instead of scattered.

"3. Establishment of a central bureau or clearing house with an executive secretary and facilities for collecting and distributing information relating to the work of the various health organizations represented.

"4. Provision of $10,000 to $20,000 for the expense of the central bureau.

"5. Appointment of a committee (of seven perhaps) to study and carry forward the plans of the bureau of health organizations."

The following resolution, which is of particular interest to the American Public Health Association, was finally adopted:

"RESOLVED, that it is the sense of this meeting that we should organize as a conference, either independently of the American Public Health Association or as a section thereof or of any other organization which should later be decided, after investigation by a committee to be appointed to work out details.

"RESOLVED, that a committee consisting of fifteen members, of which five shall constitute a quorum, shall be appointed by the chairman at his convenience, to report at a subsequent meeting."

Canadian Public Health Association.

The Third Annual Congress of the Canadian Public Health Association will be held in Regina, Sask., on September 18, 19 and 20. This will be the first occasion on which the members of the association have met in the West.

At the Congress held in Toronto last year, communications were read from the city of Regina and the government of Saskatchewan, inviting the members to make Regina their next meeting place. These invitations were unanimously accepted, and a hearty welcome will therefore be extended to the Association by Saskatchewan's Provincial Government and its Capital City.

The Provincial Government realizing the educational value of such a conference and the stimulation of interest which it will effect in matters of Public Health, have decided to bring all the medical health officers of the Province, some 200 in number, to the Congress.

There is, therefore, every indication that the attendance will equal, if not surpass, that of the two previous meetings in Montreal and Toronto.

The Secretary to the Local Arrangements Committee is Mr. R. H. Murray, Engineer to the Bureau of Public Health, Regina.

The Cost of Sanitation on the Isthmus.

"Reports have gone out from the Isthmus, both from those in authority and from newspaper writers, to the effect that sanitation has been very expensive; that when the work shall have been finished, sanitation will have cost 5 per cent. of the total expense. This comes about from getting the expenses of the sanitary department confounded with those of sanitation. The sanitary department spends a good deal of money that has no relation whatever to sanitation; for instance, more than half the revenues of the sanitary department are spent on hospitals, dispensaries, etc., things which have no relation whatever to sanitation. It is just as misleading to call such things on the Isthmus 'sanitation' as it would be here in Baltimore to charge to the health department the expenses of all hospitals and dispensaries and the incomes of the physicians and nurses. If this were done, the expenses of the Health Department of Baltimore would amount to a very large percentage of the total expense of the city government. As a matter of fact, the sanitation on the Isthmus has cost us about $400,000 per annum. This is a little more than one cent per day per capita for the total population; and when we are through, we shall have spent on sanitation about $4,000,000 instead of $20,000,000, as has been stated, 1 per cent. of the total cost of the canal instead of 5 per cent.

"I am anxious to have this misunderstanding corrected because the matter has a far wider application than to our local affairs on the Isthmus. If we hope that our work is going to be of assistance to other tropical countries, we must show that the expenses of sanitation are within the limits of their financial ability. If the South American governments are told that it has cost the American government $20,000,000 for the sanitation of this small territory of 500 square miles on the Isthmus for ten years, they will all see at once that a similar work for themselves would be entirely beyond their financial ability. But if they are informed that it has cost the Americans a little more than a cent a day per capita for the work, they will know that they are financially able to do the same. This can certainly be done by all these countries, as far as their larger and infected cities are concerned. As it is a matter that may be of great use to our tropical neighbors, both north and south of Panama, I make no apologies for bringing it up on this occasion."

An address by Colonel Gorgas, printed in the *Journal of the American Medical Association*, March 29, 1913.

International Congress on School Hygiene at Buffalo August 25–30.

All the leading nations, every state in the Union, every college and university of note in this country, and various other leading educational, scientific, medical and hygienic institutions and organizations, as well as various women's organizations, will be represented at the Fourth International Congress on School Hygiene in Buffalo, August 25–30, according to a preliminary statement just issued by Dr. Thomas A. Storey, of the College of the City of New York, Secretary-General of the Congress.

President Woodrow Wilson has accepted the honorary office of Patron of the Congress. The president of the Congress is President C. W. Eliot. The vice-presidents are Dr. William H. Welch of John Hopkins University, and Dr. Henry P. Walcott, president of the recent International Congress on Hygiene and Demography and chairman of the Massachusetts State Board of Health.

It is the aim of the organizing committee in charge to bring together at Buffalo a record of men and women interested in improving the health and efficiency of school children, and to make this Congress—the first of its kind ever held in America—one of direct benefit to each individual community. A program of papers and discussions is now being arranged covering the entire field of school hygiene. There will be scientific exhibits representing the best that is being done in school hygiene, and also commercial exhibits of educational value.

Nor will the entertainment of delegates in any way be neglected. Buffalo has just subscribed $40,000 toward covering the expenses of the Congress. The Buffalo citizens committee has planned for a series of social events, including receptions and a grand ball, a pageant in the park, and excursion trips to the great industrial plants and to Niagara Falls.

The Congress is open to all persons interested in school hygiene, who may join as regular active members upon the payment of a $5 fee. Application for membership should be sent to Dr. Thomas A. Storey, College of the City of New York, New York City.

The Cleansing of Milk Vessels.

"That some American officials are fully alive to the need for cleanliness is evident from a report of proceedings which were taken in New York against three carmen in the employ of a milk supply company for having in their possession milk cans which after being emptied of milk had not been cleansed."

Further, the *Medical Officer* for March 15, 1913, restates that part of the Sanitary Code of New York State which requires that all milk receptacles shall be cleaned when emptied, and which holds responsible the persons in whose possession an unclean receptacle is found. In reference to the recent case in which the state figured against the carmen the *Medical Officer* says:

"In taking action against the carmen, the New York State authorities would seem to have had some difficulty in getting hold of the real delinquents, who would appear to have been the persons to whom the milk had been delivered. The defending counsel, while admitting the offence, maintained that it was in the same category as that of a man found with burglars' tools in his possession. The reply of the prosecutors was that statistics would doubtless show that unclean milk receptacles were in point of fact as dangerous to the community as burglary tools. The chief justice, who was one of the judges before whom the case was tried, said that when one considered the physical conditions which surrounded a cosmopolis like New York City; the crowding together in small space of so many individuals; the dirt, filth and germs which were bound to accumulate in spite of most strenuous efforts; the poverty, sicknessand uncleanliness of so many citizens, it was at once apparent that the greatest care must be taken in the transportation of a commodity like milk, which was daily used practically in every family, and which was without doubt more susceptible of taking up germs and scattering them broadcast than any other product. After this dictum it is unnecessary to state that the prosecution was successful."

Midwives: Registration or Eradication?

The *Boston Medical and Surgical Journal* for March 20 presents articles by two writers, one of whom advocates the registration of midwives, while the other urges her elimination.

Dr. E. F. Cody, who thinks that the midwife is a necessary evil, may be quoted as follows:

"She is an economic necessity. We agree that she is a nuisance, a relic of mediævalism and an unnecessary evil and that she must go. But she does not go. We have ignored her and prosecuted two of her kind in this state, and last year she delivered three thousand women in our cotton mill cities.

"Since we cannot abolish the midwife, we can at least teach her cleanliness, the conduct of normal labor, and to recognize the onset of complications. We can secure legislation enabling constituted authorities to adopt rules and regulations for such instruction and for her admisson to practice and exclusion from practice and to regulate and supervise her work."

On the other hand, J. L. Huntington, advocating the absolute elimination of this type of practitioner, indicates his attitude in the following words:

"It would seem as if we had reached that stage of social education where the rights of all should be recognized and respected. How can we with any justice suggest one class of service for the poor and ignorant and another for the well-to-do and educated? No other branch of medicine tolerates this dual standard—two classes of practitioners, one semi-trained and the other thoroughly educated. This is a problem to be solved by the obstetrically trained physicians and not by pediatricians, statisticians and board of health men unassisted by expert obstetrical advice. No man unless he is thoroughly trained in obstetrics is likely to realize the utter hopelessness of ever solving the obstetrical problem of the poor by the services of the midwife.

"The course lies open. Massachusetts is in a position where public ignorance and apathy will readily allow the adoption of the midwife system—a system which has never proved successful in any country. But if we as obstetricians will firmly stand our ground and by exerting every effort educate the community in the importance of obstetrics, we can by the aid of our present law gradually solve the anomalous position of the midwife and place Massachusetts at the forefront in the march of Preventive Medicine."

Vital Statistics and Advertising.

"It has been the custom in the past for resorts with a favorable climate to advertise their 'pure air' as an inducement to tourists, invalids and settlers—making use, in so doing, of 'hot air,' or just ordinary 'blowing.' Now that the value of climatic conditions with reference to health can be more correctly estimated, mere statements as to natural advantages in the way of springs, air, sunshine, etc., do not carry such weight. Something more definite must be presented. Health conditions in city or resort, to be regarded as an asset for drawing visitors or permanent residents, must be based on actual figures, and many places now vie with each other in that respect. The Manitou Springs Hot Iron Club, a commercial organization, in order to attract visitors and residents, circulates a letter calling attention to the vital statistics and morbidity record of that city, as compiled by the city physician. This is a rather novel idea. As the health of its inhabitants is the best business asset which any place can have, it is good business and good advertising for business men's associations to call attention to the actual figures with reference to their city in this manner."

Journal of the American Medical Association, March 22, 1913.

School Shoes for Children.

"Amongst the items of news contained in the monthly reports on the primary schools of the German Empire is the following:—In one district the local authorities have decided to provide the children with felt shoes to be worn during school hours. This is at Pollwitz, near Glogau. The medical officer had made several complaints as to the general inefficiency of the footwear of the children, and had pointed out that it meant that the children had often to sit through the day in winter with their feet thoroughly wet. With the equipment of felt shoes the authorities have given orders that the other shoes shall be properly dried during the lesson-time."

Public Health, March, 1913.

New York City's Declining Death Rates.

"That there is cause for rejoicing among the unborn babes of the future is due to the Babies' Welfare Association of New York, to whom is attributed the reduction in the death rate among babies during 1912. The general death rate of 15.13 per cent. for 1911 was reduced to 14.11 for 1912; the rate for infants one year old or less was lowered 6 per cent.

"The association's systematic campaign of prevention of infant diseases is held accountable for the fewer deaths. We graphically see its value when we compare the infant death rate in the Bronx, one of the boroughs, with the others. Of the eighty milk stations, only three are in the Bronx. It was the only borough that did not show a falling off in the rate of infant deaths.

"The fact that the death rate can still be lowered 1-16 when preventive medicine is still in its comparative infancy as compared with curative medicine, shows what great accomplishments can be expected of this new branch of science."

The Dietetic and Hygienic Gazette, March 1913.

The Importance of Governor Sulzer's Health Committee.

"The political millennium is not so far away as we have been taught. At least its 'rosy-fingered dawn' is here with assurance of a day that shall fulfill the promises of its early messengers.

"My proof? The report of Gov. William Sulzer's 'special commission to collect facts, receive suggestions and make recommendations as to changes in the public health laws and their administration', for New York State.

"Important enough for its statements of fact and its recommendations, this report is bound to have nation-wide by-products in new kinds of social service by state health and school departments; new conservation activities by rural districts; new direction for volunteer social service; and new ways of fulfilling pledges, making friends and disarming enemies by governors and other public officers."

William H. Allen in *The Survey*, March 15, 1913.

Federal Health Expenditures.

"During 1912 the United States government spent $19,800,086.23 for 'its health departments, bureaus, and all other health activities in its various branches.' This information has just been compiled by the secretary of the treasury in response to a resolution of inquiry introduced by Senator Works of California. The estimate includes not only the Public Health Service, together with the medical and hospital work of the War Department, the Navy Department, the Department of Agriculture and the Panama Canal sanitary service, but also various bureaus and funds little known to the public at large.

"Among these last may be mentioned the International Sanitary Bureau, the International Office of Public Health, the International Conference of the Red Cross, and the International Congress on Hygiene and Demography—all under the State Department. Under the Department of Justice come the health activities in connection with the support of United States prisoners, amounting to $39,759.76 and the National Training School for Boys.

"The number of officers and employees on the federal pay rolls engaged in public health and medical service is between 15,000 and 16,000."

The Survey, March 22, 1913.

Working Mothers—Neglected Children.

"During school inspections at Dundee last year it was noted that the majority of children showing want of cleanliness were over six years of age. In many such cases it was discovered that an older brother or sister looked after the children while the mother was at work. In this connection, Dr. A. E. Kidd, S.M.O., writes:—'When one considers the fact that 54.6 per cent. of the married women under 20 years of age, 41.1 per cent, of the married women from 20 to 24 years of age, and 25.2 per cent. of the married women from 25 to 44 years of age are employed in various industries, the difficulty of proper attention being given to children is easily understood.' Doctor Kidd thinks the fact that the meal hours of the children and parents are at different times, that the parents are away at work when many of the children are setting out for school, and that in some instances the children have to play in the streets until the return of the parents from work, must result in great hardships to the children, both from want of supervision in regard to their clothing, and also in the matter of the food they receive, which, although often ample, is in many cases quite unsuitable for the wants of a growing child."

The Medical Officer, March 22, 1913.

Contaminated Vegetables.

"It is customary in investigations to discover the causes operative in the production of outbreaks of typhoid fever, to inquire, among other things, as to whether persons who have been attacked by the disease have used fresh or uncooked vegetables as part of their diet during the two or three weeks prior to the onset of the disease.

"The reason for making such inquiry is that in some localities vegetable gardens have been handled in such an insanitary manner that they have become a danger to the community, not only for the reason that typhoid fever can be spread through the agency of vegetables, but because other serious diseases, such as amebic dysentery and bacillary dysentery, may be transmitted in the same manner.

" It has been the custom in the Orient, for no one knows how many years, to use night soil as a fertilizer in vegetables garden. In fact, the practice is so common that there is a regularly established traffic in this commodity, and owners and operators of vegetable gardens, in addition to carefully saving the excrement of themselves, their families, and laborers, make periodical trips to the nearest market for the purpose of purchasing such additional materials as may be needed. An understanding of this custom will make plain the reason why disease, due to practices of this kind, is common in oriental countries.

" The method of using the material varies in different localities. The practice is first to mix a certain amount with the soil at or near the time of planting the seed; then at later periods, when the vegetables are growing, to sprinkle a thin solution of night soil from a sprinkling can over the growing vegetables. In certain portions of the Orient it is a common thing to see a laborer walking between rows of young vegetables with a bamboo pole over his shoulder from each end of which there hangs a sprinkling can. The streams from these cans are carefully directed onto the tops of the young vegetables, and two rows can thus be treated at one time.

" In certain portions of the United States it is not uncommon to use sewage as it issues from the sewerage system of cities or towns for irrigation purposes, either by diverting it into a channel which leads through the garden, or by dipping it from polluted streams, vaults or vats, and applying it. In several communities, owners of large vegetable gardens collect night soil, and furnish, clean, and change the pails or receptacles, free of charge to the householder. In these instances the matter collected is usually mixed with the earth of the garden.

" It has been found that vegetables grown in soil infected with the germ of typhoid fever had the germs of the disease upon the leaves and stems 31 days after the soil was infected, and the same germ was found in the ground itself 35 days after it was infected. Rainfall and sunlight did not kill or remove the germ."

Public Health Reports, March 28, 1913.

The Use of the Typhoid Vaccine.

In a recent pamphlet the Department of Health of the City of New York designated the following classes of people as those who are particularly benefited by immunization against typhoid:

" *a.* Physicians, hospital internes, medical students, male and female nurses and orderlies in hospitals.

" *b.* Members of families among whom typhoid carriers have been proved to exist, or those exposed to the disease or who expect to be brought in contact with it.

" *c.* Persons who expect to travel or settle in places which are habitual foci of typhoid fever.

" *d.* Those living in regions where typhoid fever is prevalent."

The Department also announces the following general conclusion in regard to the treatment:

" 1. The practice confers a notable immunity against typhoid infection.

" 2. It reduces by three quarters the case incidence of typhoid fever in groups of individuals submitted to this method of immunization.

" 3. Under similar conditions, typhoid fever occurring in immunized persons has approximately one half the fatality of typhoid cases in persons not so protected.

"4. Typhoid fever thus is less apt to occur, and when it does occur, runs a milder course among the sick who have been immunized than among those who have not."

Insanitary Road Paving.

" Dr. R. Sydney Marsden has been repeating a warning given to the Birkenhead Health Committee several years in succession—viz., that one of the most important sanitary requirements of the borough is the abolition of the cobble paving, which still exists in a large number of the streets. He writes:—' The crevices between the cobble stones form small catch-pits for filth of every description, and cannot be properly cleansed, even with considerable attention being paid to them. When they are neglected or only half cleansed they are a source of distinct danger, and it is therefore desirable that this form of paving should be entirely done away with, or at least its gradual but steady removal accomplished.' Doctor Marsden declares that in the light of recent scientific work on the breeding of flies and their action as disease carriers, any town which allows this kind of paving to continue must be considered as behind the times."

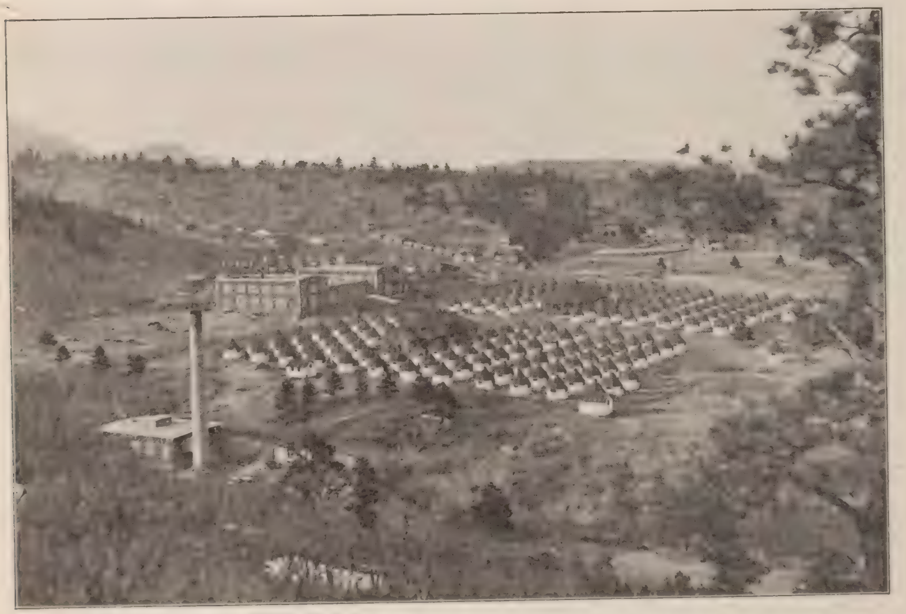
The Medical Officer, February 15, 1913.

Tuberculosis and Housing.

"The Paris Health Bureau has a complete record of every one of the 80,653 houses in the city, showing the sanitary equipment, the cases of sickness, deaths, and like data, and from a study of these, the bureau announces that all of the 101,496 deaths that have occurred from tuberculosis in the last ten years, occurred in 38,477 houses. The records of these 38,477 houses show that tuberculosis is concentrated in certain quarters, and that outside of this the disease is not more prevalent than other diseases."

Life and Health May, 1913.

COLORADO SPRINGS MEETING, A. P. H. A., SEPTEMBER, 9–13.



Ten miles to the north of Colorado Springs has recently been established a national sanatorium of the Modern Woodmen of America. This institution has been erected and is maintained for the free treatment of members of the society afflicted with tuberculosis. More than one million dollars has been expended in the institution.

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SEWAGE TREATMENT VS. SEWAGE PURIFICATION.

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The art of sewage purification has been making progress during recent years. Of this there is no doubt. The nature of the advance, however, has not been that which the popular mind believes it to have been. It has not been in the direction of making sewage more nearly resemble drinking water so much as it has been in adjusting the treatment to particular needs, making the treated sewage fit for discharge into some particular stream or lake, taking into account the subsequent use of this water. The greatest progress has not been in obtaining a higher degree of purity for sewage effluents, but rather in the invention of methods and devices applicable to conditions not previously encountered. To illustrate: the general results of that notable series of experiments made a quarter of a century ago by the Massachusetts State Board of Health at Lawrence was that the application of sewage to land according to the method known as intermittent sand filtration was the one best suited to the local conditions of that state. Time has proved that this conclusion was correct, and the plants that have been constructed have on the whole given satisfactory results. Intermittent sand filtration gives a relatively high degree of bacterial efficiency. But sandy soils of the proper character do not exist everywhere in the United States; they do not exist in England. Large areas are required and it is not often that these can be found at the proper elevation near large cities. Therefore, this excellent method of sewage purification is much limited in its application. The need of processes to fit other conditions led to the use of improved screens, of chemical precipitation works, of septic tanks, of sprinkling filters, of contact beds, processes excellent in their way, but as ordinarily operated not capable of purifying the sewage to the same extent as the older method of treatment on land. Yet, and this is the point of my paper, these miscellaneous processes all go popularly under the name "sewage purification plants." In a certain sense this is correct, for they contribute to the removal of the objectionable ingredients and living organisms in the sewage. The sanitary engineer, knowing the nature of the results, makes a proper mental discount of the term and is not deceived. The layman, however, takes the word "purification" at its face value and is deceived. How many times do we hear city officials proudly boast that the sewage of their city is in no way dangerous because it is purified in a septic tank, when it would seem that the use of one's nose and the application of a little common sense would lead to a different conclusion!

There is no more fatal error in logic than failure to properly define the premises; nothing contributes so much to controversy and misunderstanding as the use of terms of uncertain meaning. The speaker believes that much of the prevailing discussion with respect to the advisability of adopting this or that method of guarding water supplies against infection, and of preserving the quality of the water in our waterways has been confused in the minds of many on account of the use of the term "sewage purification" to cover methods and processes that do not make the sewage pure.

It is gratifying to observe that there is an increasing tendency among sanitary engineers to substitute for the term "sewage purification" the words "sewage treatment." Notably Mr. George W. Fuller has adopted this language in his recent admirable treatise on sewage disposal. It is to be hoped that its use will become general. If not, the term "sewage purification" will inevitably become degraded as people come to learn, as they must, that not all so-called purification plants really purify the sewage. The term "sewage treatment" does not imply complete purification and is, therefore, the more general and the better term.

Using the words in their most obvious meaning, let us ask the question, ought the sewage of our American cities to be purified? Generally speaking, no. To do so would be enormously expensive, and in most cases the results accomplished would not be commensurate with the cost. Ought the sewage of our American cities to be treated in some way before being discharged? Generally speaking, yes. There are relatively few instances where raw sewage can be discharged into streams or lakes without causing objectionable local conditions or dangers of a sanitary character. The nature of the treatment required will vary all the way from a mere straining out of the grosser solids to a combination of processes that results in actual purification.

We hear it said that in England practically all of the sewage is purified. Is this true? Yes, if it is meant that the sewage is submitted to some process that improves its character; but no, if it is meant that these processes completely remove the organic matter and free the sewage of its dangerous bacteria. For example, we like to refer to the interesting sewage works at Manchester and Salford with their great septic tanks and contact beds and sprinkling filters, and we speak of them as purification plants. Do we realize, however, that analyses of the sewage effluents show that during a large part of the time they fall below the standard of purity established by the Mersey and Irwell Joint Committee, a standard that cannot be regarded as too strict if we maintain a reasonable meaning of the word "pure." The biennial report of Hugh Stowell, chief inspector for the Mersey and Irwell district, dated May, 1912, states that out of 126 sewage works 23 per cent were non-efficient, this being an improvement over 34 per cent as shown by his previous report. At Manchester 22 per cent of the samples were below the established limit for organic matter of "one grain of oxygen absorbed per Imperial gallon in four hours," at Salford 12.8 per cent of the samples were below standard. This is not intended as a criticism of English methods of treatment, which, on the whole, are well adapted to their particular needs, but merely to illustrate the danger of using loose phraseology.

Or to take another illustration, can the water supplies of our lakes be protected by purifying the sewage that enters them? Many laymen think so, and ardently advocate the construction of sewage purification plants and oppose water filtration. Would they say the same if they realized that most so-called sewage purification plants only partially remove the dangerous substances from the sewage, and that complete removal is impracticable on account of the expense and the almost insuperable difficulty of treating all of the sewage at times of storm. Would not these well-meaning people have a clearer conception of the problem if instead of using the broad misleading word "purification," we used the term "sewage treatment," or still better, some term that described definitely the results accomplished by the different processes.

With laws being framed in various states to control the pollution of rivers and waterways, it is high time that popular misconceptions should be corrected and that the different phases of this complicated problem should be made clear. In the first place, it should be more definitely understood that in the treatment of sewage there are two very different functions to be considered. One is to get rid of the foul, putrescible matter with its accompanying offensive smell; the other is to get rid of living, disease-producing organisms. One is very largely a physical and biochemical problem; the other is chiefly bacteriological. One does not directly concern the public health; the other may. In practice, these functions overlap but they may be kept separate.

Is it not the popular conception of the function of sewage disposal plants that they are intended primarily to protect the public health? Is not this the theory upon which some of the recent legislation is based? It certainly appears so. But is this idea correct? Does the treatment of sewage by the ordinary process materially improve the public health? Are sewage works a success from the hygienic point of view? It is a vital question and one that has not been sufficiently considered from the standpoint of cost and result.

Sanitary history has shown that when polluted water supplies have been purified by filtration, the typhoid fever death rate of the community has lessened and the public health has otherwise materially improved. And it is a matter of easy reckoning to tell that the financial benefits represented by the saving of human lives and the prevention of sickness have far exceeded the cost of filtration. Taking the cost of efficient water purification at $10 per million gallons and allowing a per capita water consumption of 100 gallons per day, the process pays for itself if it reduces the typhoid fever death rate by 4 per 100,000.

No such record can be shown for the purification of sewage, except, perhaps, in the case of a few small plants built for the protection of the water supply of some large city, and even here it is difficult to measure the number of lives that have been saved. The complete diversion of sewage from the drainage area of a public water supply has repeatedly been of hygienic benefit. So has the introduction of sewer systems in cities and towns where none existed before. But the so-called purification plants that have been constructed for the large cities of the world have not the saving of many human lives to their credit, so far as the best available evidence shows. The reason is obvious. They have not, as a rule, been built for that purpose, popular ideas to the contrary notwithstanding.

Sanitarians abroad have long recognized the fact that river water supplies cannot be protected against the danger of infection by any of the known methods of treating sewage discharged into the river above the water works intake. Instead they depend upon the filtration of the water supplies themselves. In Germany the filtration of surface water supplies is required by law and no difficulty has been found in building water filtration plants capable of purifying water after it has received what would be regarded in this country as a large amount of sewage. In Germany and in England sewage disposal works are built primarily to remove organic matter and prevent streams from becoming foul. Therefore, when public health authorities in this country compel large cities to construct sewage treatment plants for the avowed purpose of protecting water supplies taken from rivers below them, they are attempting to accomplish the impracticable, and are compelling the expenditure of money without adequate returns. The most that can be expected in this direction is to lessen the burden placed upon the water filters. In some instances this may be desirable and necessary, for water filtration plants, like all other mechanisms, sometimes fall short of their best performance, and it is only reasonable to allow a certain factor of safety.

The pollution of water supplies is not the only thing involved in this matter. Sometimes it is a question of protecting shell-fish supplies, or of bettering the sanitary condition of the water at bathing beaches. These may be fairly classed among the direct sanitary benefits of sewage treatment, but here the treatment to be of benefit must be quite complete and, therefore, expensive, while the number of lives saved in this way is probably small.

It would not be right to balance the cost of sewage purification against the saving of human lives were it not for the fact that our cities are subject to debt limits and that money is needed for many other purposes that affect the public health: for cleaner streets, for better care of schoolhouses, for parks and playgrounds, and for the special needs of the Department of Health in securing safer milk and food supplies, and for all sorts of hygienic and sanitary inspections. In view of the steadily increasing tax rates in our large cities, it behooves sanitarians to find out for each city in what direction money allotted to the saving of human lives will do the most good. In other words how can the most lives be saved for a dollar? Whatever the answer may be, it is not likely to be found in the purification of sewage.

That the sewage of most American cities should be subjected to some form of treatment is conceded. The need will increase as our cities increase in size and number. The problem at hand is to determine the most appropriate treatment for each case, bearing in mind the results that can be accomplished, the peculiar local condition, and the cost of construction, maintenance, depreciation and operation.

Processes of treatment perform one or more of these functions: clarification of the sewage, oxidation of the organic matter and removal of bacteria. The effect of the methods of treatment now available and in common use are given by Fuller in his treatise already referred to as follows:

Method	Percentage Purification		
	Suspended Matter	Organic Matter	Bacteria
Fine screens (30 mesh or finer)	15	10	15
Sedimentation	65	30	65
Septic treatment	65	30	65
Chemical precipitation	85	50	85
Contract filters*	85–90	65–70	80–85
Sprinkling filters*	85–90	65–70	90–95
Intermittent sand filters *	95–99	90–98	98–99

* The figures for the last three forms of treatment are on the assumption that the sewage is given some form of preparatory treatment before it is applied to the filters, and that with the sprinkling filters the effluent is allowed to settle.

It is evident that some of the processes that are used primarily to prevent sewage from producing foul conditions, do also remove many bacteria, and to the extent that they do this they improve the sanitary quality of the treated sewage. Often this can be accomplished at low cost, while to effect a reasonably complete and useful bacterial removal would very greatly add to the expense. This treatment of sewage to a less degree than that of complete sanitary purification may pay, even though the direct hygiene aspects of the case be ignored, for whatever eliminates public nuisances adds to the comfort of the people at large, and tends to restore depreciated real estate values.

The above ideas are not new to sanitary engineers; they know the limitations of the various methods of treatment; they know how well they work when kept in order, and how grievously they fail when not properly operated and enlarged as need requires; they are able to determine what methods or combination of methods are best suited to any case. Yet in common parlance and in official reports they continue to say "sewage purification" when they mean something less. Perhaps a better term than "sewage treatment" can be found, but let us at least be more particular in the use of terms describing the processes discussed, lest the cause of sanitation suffers a reaction from the over-zealous interest of laymen based on false conceptions.

DISCUSSION.

Mr. Rudolph Hering, *New York City:*

Mr. Whipple's paper touches a very important subject, so far as our general public is concerned. It is very timely to call attention to the inclination to use the word "purification" when we mean only some treatment of sewage.

There are but few persons, outside of those engaged in this subject, that have a clear idea of the difference between sewage treatment and purification, believing generally that any work for treatment means one which effects purification. Indeed, outside of very carefully conducted intermittent sand filtration works, it is a question whether sewage is really purified by any of the ordinary treatment plants, unless we consider that a long flow in a water course ultimately purifies sewage.

Mr. Whipple emphasizes the correct and sound view, not generally held, that sewage should in any case not be purified further than economical considerations justify, and also the fact which is gradually being recognized, that even where domestic sewage discharged into rivers has been highly purified, it is still necessary to purify any water supplies taken from such rivers.

Too much emphasis cannot be given to the fact that our communities have only those amounts of money to spend for sanitary improvements which can be raised by taxation, and that there are many purposes for which expenditures are necessary. Sewage purification is but one of them. The citizens of a community must first be clear as to the amounts of money they will spend for each of the various different sanitary purposes, and then secure the best results which can be had for the money that is available.

Of course a subsequent closer study of these subjects might change first impressions. Therefore, where there is any doubt, a most careful study should be made by competent parties, to proportion the expenditures so that the public health will be most properly served.

These conclusions cannot be better stated than in Mr. Whipple's own words, which could not at this time be too often repeated: "In view of the steadily increasing tax rates in our large cities it behooves sanitarians to find out for each city in which direction money allotted to the saving of human lives will do the most good. In other words, how can the most lives be saved for a dollar."

The paper suggests another subject which is too often misunderstood, namely, the removal of bacteria from sewerage effluents.

Now, when we recognize the fact that a large amount of sewage purification is accomplished by bacterial activity, we should not consider it an unmixed advantage to remove bacteria from a polluted water. We might add hypochlorite of lime to the water and destroy practically all bacteria and all putrefaction. Would the sewage then have been purified? By no means. Within a few days, if not hours, the same water might again putrefy.

We should rather endeavor to create conditions which increase the number of bacteria which do the purifying, until the desired degree of purification has been effected, and when, there being no further food for the bacteria, their extinction is a natural consequence.

Having this desirable result in view, we must, on the other hand, not overlook the equally desirable result of creating conditions which extinguish all bacteria that are pathogenic. Fortunately, most of the latter do not thrive outside of organic bodies and have also other favorable qualities, which in the future may make it possible to facilitate their destruction, without also destroying the bacteria which are necessary for sewage purification.

Dr. John A. Amyot, *Toronto:*

It is too frequently not realized that sewerage and sewage treatment are two different things. The costs are usually given out combined. The cost of a treatment plant and afterwards maintenance is only a small percentage of the general cost. It is from this that sewage treatment is so often erroneously put down as being prohibitive in cost. It costs more to maintain the sewers of a city than to maintain a treatment plant. The sewers cost many times more than a treatment plant. The time has come when cities must keep as clean as individuals and must not any more than individuals dirty other people's property. The most important thing for cities now to remember is that their sewage is a disease-carrying material, and that the time has come when other people must not be caused to suffer because they want the modern comforts and safety of city life. They must pay for it. They pay high for other things, why squeal at this one.

Mr. F. Herbert Snow, *Harrisburg, Pa.:*

I am not sure whether I understand the position which Professor Whipple takes with respect to the importance of treating sewage before the effluent is discharged into a body of water—particularly running water used subsequently as a source of public water supply. If he means to be understood as maintaining the position that there are few situations where the necessity exists for the treatment of the sewage in those cases where further down the stream the water is used as a source of filtered supply to the public, then I beg to differ with him in opinion.

We have had a number of striking illustrations in Pennsylvania of the failure of water filter plants to properly purify sewage polluted waters before they are supplied for drinking purposes to the citizens of the town. Ordinarily, water may be purified sufficiently to render it safe and wholesome, but occasionally the filters may be overtaxed, accidents may occur, or carelessness in operation may obtain, resulting in the admission to the public system in the town of water containing sewage organisms, followed by increased typhoid fever among the consumers. These cases emphasize the importance of controlling the pollution of the water at the point when the pollution occurs.

I am perfectly well aware of the fact that if the water purification plant be operated efficiently, if skilled attendants be provided, if the plant be ample in size and no lapse in faithful management occurs and if no accidents happen, a very high degree of protection is afforded at such water purification plant.

Furthermore, I am willing to agree that of the two safeguards to public health, namely, treatment of the sewage in the first place and the subsequent purification of the river water in the second place, the latter is more essential and that it is the proper place at which attention should be bestowed primarily.

The introduction of filtration works to render a suspicious source of supply pure and wholesome is quite frequently attended with a reduction in typhoid and other water-borne diseases 75 per cent. or more. I do not wish to minimize the importance, but would urge the necessity for the proper filtration and purification of all source of water supplies subject to much organic contamination. But I insist that it is essential in protecting public health to put up all reasonable barriers to the transmission of infection into the homes of the water consumers.

I base my conclusions upon extended experience and principally from observation as to the origin and transmission of typhoid infection and the consequent spread of disease in the town, due to contamination of public drinking water.

Because the protective value to public health by the water filter plant is so frequently and strikingly demonstrated in the drop of typhoid fever immediately following the installation of the water filter plant, and because there is no corresponding drop when sewage treatment works are built, one might form the conclusion that treatment of sewage does not bear an important relation to public health in the protection of public water supplies. I think sanitarians, and particularly the sanitary engineers, should be very cautious in their statements delivered to the public regarding this matter.

I did not know before yesterday, not having come in contact with it in my work, that in some places the public officials seem to think that the erection and maintenance of sewage treatment works is a sufficient protection in itself to the public water supply, and that of the two, the sewage treatment or the water treatment, these officials seemed satisfied to accept sewage treatment as sufficient. I do not want any doubt to exist in any one's mind as to the position which I take on this subject. Water filtration is the more important. The point where I apparently differ with Professor Whipple is that he, if I understand it correctly, minimizes the importance of sewage treatment in the protection of public water supplies to a degree that I cannot sustain. If this is an erroneous view, I shall be very glad to be corrected.

In considering this subject briefly, we may take up first the mountainous unpopulated watershed where the areas yield pure brook and spring waters that are contaminated, if ever, to a slight degree only and by accident. Even such waters may be infected and result in widespread sickness and death in the town miles away, as amply illustrated in a number of cases in Pennsylvania. But the circumstances in this class of watershed do not warrant the compulsory installation of water filtration plants, or the construction of impounding reservoirs as a barrier to transmission of infection into the town where the volume of flow in the stream is sufficient for public purposes. If industrial camps or other temporary occupations of the watershed occur, they should be under the supervision and sanitary regulation of some authority. In Pennsylvania, municipalities and corporations securing their supply from such areas, are required to maintain proper sanitary patrol.

We then come to the upland watershed sparsely populated. Here the area may be largely wooded with an occasional farmstead noted. There are many areas in Pennsylvania averaging about twenty-five inhabitants per square mile from which the waters yielded are impounded and supplied to the public beyond for drinking purposes. No sewers exist on these watersheds and no industries with their wastes to defile the streams. The pollutions when they occur come from fertilization of the soil and from the improper disposal of wastes at the dwelling or barn-yard. A sanitary survey of the watershed and the maintenance of proper standards of sanitation at the farmstead is sufficient, plus the barrier which the impounding of waters affords to the transmission of infection, to safeguard the health of the consumers of this water in the town in a large number of instances. The prompt reporting of all contagious and infectious diseases among these rural inhabitants, the proper disposal of the wastes on the watershed and the systematic inspection of all occupied estates is considered sufficient. In both of these classes of watersheds attention to the disposal of the sewage is of primary importance.

Now then, we come to the next kind of watershed. The population is more. It will range up to as high as one hundred and twenty-five inhabitants per square mile. On this area, villages will be found and foci of infection will exist which increases the liability to organic pollution of the waters of the streams to such a degree as to menace public health in a town relying for drinking water upon the streams from such areas, and in consequence additional precautions beyond that of sanitary inspections and proper disposal of sewage at the household are necessary. A large impounding reservoir or the addition of a germicide to the water before sending it into the town, or the installation of a water filtration plant are the safeguards. It may be sufficient to rely upon the impounding factor, plus the use of a germicide; or, after this is tried, it may be found that there is still too much of an element of risk to public health. If so, then the filter may be added; but before this is done you see the attention to proper disposal of the sewage at the dwellings has been a primary factor.

Now then, we come to another kind of watershed; one upon which large villages or small towns or boroughs exist, having public water supplies and sewer systems or upon which large industries are located, the wastes of which contaminate the water of the creek or river. Here it is quite possible that no amount of treatment of the sewage from the sewer system will protect the purity of the waters of the stream to a degree rendering them suitable to use without treatment in a water filtration plant and it is in such a case as this, as I understand it, that the point is debatable as to whether any attention should be bestowed upon the treatment of the sewage.

We must not overlook the fact of the legal rights existing in public waters and the sanitary engineer must be governed to a large extent in his views and conclusions by the demands of the rights vested in landowners through whose property living streams of water flow. No one under common law has a right to defile a stream to such an extent as to render the waters impure or unsuitable for common use below. But in practice the courts have had to modify their views and decisions to fit into changing conditions that are beyond the control of human agency. For instance, there is a natural pollution of a river incident with the gathering of people in great numbers upon small areas which is a nonpreventable and therefore, in one sense, a legal pollution of the waters. The wash from streets of the city is sewage. It may not contain as many pathogenic organisms as the sewage discharged into the river from the sewer, but at the same time such surface drainage contaminates a water and renders it unsuitable for drinking purposes without purification. And so there are numerous cases where attention to the treatment of the sewage flowing from the sewers of the town would not assure a standard of drinking water demanded in the interests of public health.

Furthermore, industries become important over large areas, including several counties, and the accompanying contamination of the waters of the region by these industrial activities being unavoidable, has resulted in the enactment of law that this peculiar contamination (and I have in mind now drainage from coal mining operations in the great anthracite and bituminous coal fields of Pennsylvania) shall be permitted without hindrance. Individuals have appealed from this law to the courts, demanding the protection of their property rights as higher than any legislative enactment, and the courts have determined that this great coal resource must be developed for the uses of the country, and that incident to this development a pollution of the waters of the district occurs that cannot be prevented and hence it is good public policy to accept and permit the mineral contamination of public waters in the coal fields even though it does deprive all riparian owners of the use of the stream in so far as purity and potability of the waters are concerned.

Riparian rights to the purity of waters are to be protected. They may be interfered with to some extent by decisions of the courts and by statutory regulations, and there may be remedies at law for this interference, but when it comes to matters pertaining to public health, the sanitary engineer should consider that no situation can remain that tolerates the poisoning of a source of water supply to the extent to be a menace to public health. An individual caught putting prussic acid into the town reservoir would be summarily dealt with, and an individual caught infecting a town reservoir with typhoid dejecta would also be summarily dealt with and he would be committing a crime whether it were intentional or not.

From the health standpoint we are fighting the invasion of an enemy, powerful and insidious and that advances upon civilization along many avenues. The science of this warfare demands the erection of as many barriers to this invasion as are practicable. Surely one barrier only is not sufficient. All along the avenues of approach should attempts be made to stop the enemy. The point that I emphasize is that if Doctor Dixon's slogan, "kill the germ in the bed-pan" could be applied at the bed-side of every typhoid fever patient, and there were no such thing as typhoid carriers, the disease of typhoid could be stamped out immediately in the country and there would then be no necessity for the water filter plant so far as removing the typhoid germ is concerned from the water, because the germ would not be in the water.

Is there anyone who would argue against the killing of the germ in the bed-pan if this were possible? Does anyone argue even now against the regulation compelling nurses in the hospitals and compelling nurses in the homes of patients and of urging the necesssity upon all those who attend cases of typhoid fever, to disinfect thoroughly the discharges of the patient with the object of killing the infection there in the sick-room? No! There is not a man of us who does not subscribe to this principle of warfare against the enemy, and it is only because this operation in the sick-room is neglected or carelessly performed that so much of this pathogenic contamination gets beyond the dwelling and into the water supplies and the food supplies of the country, and maintains the high rate of cases and deaths throughout our land.

Very well, the next best place to kill the germ before it gets out of the town is at the mouth of the sewer. There are methods of disinfection that are inexpensive to apply first as to installation and as to cost of operation thereafter, by which not all of the germs may be killed but by which a large proportion of them will be destroyed; thus reducing the danger of widespread dissemination of the disease.

It may not be necessary in this warfare against the germ to erect extensive and costly sewage works to purify the sewage to a standard of nitrification; the refinement in purification can be accomplished farther down stream at the water purification plant; but I would emphasize the importance of destroying as much of the enemy's power as practicable by the treating of the sewage at the mouth of the sewer in the manner described.

We have heard it said that attention to the environment is not necessary or important and besides it costs too much; that it is cheaper to direct attention to water filtration. Now I believe that the methods I am now advocating are not costly, nor impracticable; but that they will prove very efficacious and along the lines demanded by the campaign of disease prevention.

Mr. T. Chalkley Hatton:

The speaker was not present at the General Session this morning and unfortunately did not hear Professor Whipple's paper on "Sewage Treatment *v.* Sewage Purification," he assumes, however, from the remarks just made by Mr. Snow that this paper suggests first the proper purification of the water supply, followed only by such sewerage treatment as may be necessary to prevent nuisance.

If such suggestion has been made by Professor Whipple I cannot agree with him altogether, although appreciating that there are many situations when such procedure would be all that was necessary. Sewage treatment is not an act performed entirely for the benefit of those who actually perform it, but, in many instances, for the benefit of those who may be located within the same drainage area, and who are forced to use the waters into which the treated sewerage has been discharged, for domestic and other purposes.

It is not enough that those who actually use the water for domestic purposes should see to it that it is made entirely safe, as there are times in the history of all water purification plants when the effluent therefrom is below the safety standard.

If a polluted water is being used at such a time, the chances are that the users of such effluent will suffer.

The speaker has an instance of this in his own mind. The City of Wilmington is located on the Brandywine River, about thirty miles below the Borough of Coatesville which has a population of about 11,000 persons, and which discharges its crude sewage into the Brandywine from which the City of Wilmington secures its water supply.

Wilmington installed, two years ago, a very efficient slow sand filter, and has operated it successfully with the exception of a very short period during February of 1912, when, through the formation of ice upon the filters, due to the long continual extraordinary cold weather, the filters became air locked, to some extent, and the character of the effluent was far below the standard, running from 25 b. per c.c. to 2500 per c.c.

At this time there was a very virulent epidemic of typhoid fever prevalent in Coatesville, which was unknown to the citizens of Wilmington, and before the knowledge of this epidemic came to Wilmington its citizens had become inoculated with it to some extent.

Had Coatesville been treating its crude sewage to such an extent as to eliminate the pathogenic germs, Wilmington would not have been endangered even though its filter plant had been temporarily working inefficiently.

In the speaker's judgment the citizens of a community have no legal or moral right to pollute the waters of a drainage area that another community living thereon cannot use them for any purpose desired with perfect safety, providing of course the latter community takes all reasonable precautions to protect itself from such pollution and in the light of our present knowledge of water purification such reasonable precautions are not such that a highly polluted water can at all times and under all conditions be made entirely safe, so that the drinking water should not only be purified but the sewage should also be purified of pathogenic germs.

Mr. M. N. Baker, *Montclair, N. J.:*

It is indeed unfortunate that the term "sewage purification" has come into such general use in this country. Only a few sewage treatment plants, the world over, attempt to *purify* sewage, the almost universal object being the prevention of nuisance.

In health-protective work, the constant aim should be to make each dollar save the greatest possible number of lives. A dollar spent for water purification and for various other objects will usually go farther in life saving than many dollars spent for sewage treatment.

Dr. F. M. Meader:

I come from a city of 140,000 people. About five miles distance is a village of 3,500 people. Between my city and this village is a small stream measuring about ten feet wide and two feet deep, and flowing at the rate of one foot per second. This stream passes through thirteen farms on which are kept 374 cows which supply milk to this city.

The sewage from the village is discharging practically untreated into this stream. The question arose, if this sewage contains numerous typhoid organisms, what danger might there be to our milk supply? In order to answer this question, we heavily polluted this stream with Bacillus prodigiosus, an organism which produces a red pigment and grows luxuriously at room temperature. At a distance of one and one-fourth miles below the place of pollution a cow's udder was polluted with the infectious material coming down the stream. Shortly afterward she was milked and the milk incubated at room temperature for 24 hours. At the end of this period it was found to have a red pigment, showing that if her udder was infected from a polluted stream the infection might gain access to her milk, and thus endanger the milk supply to which she contributed. The conditions, however, were felt to be such that the probability of such an infection occurring was more or less remote, but the possibility was present, and clearly marked out the line of safety; namely, to clean up the stream or keep the cows out of the brook.

THE CHEMICAL MEASURE OF STREAM POLLUTION AND SPECIFICATIONS FOR SEWAGE EFFLUENTS

EARLE B. PHELPS.

Read before the Sanitary Engineering Section, American Public Health Association, Washington, D. C. September, 1912.

Chemical analysis has long played an important part in the determination of the degree of pollution of natural waters, and in the measurement of the results of sewage purification. The methods employed for this purpose have been inherited from the older methods of water analysis almost without change. The latter were designed primarily to determine the purity of drinking waters but they have been adhered to in sewage work despite the fact that sanitarians have long since abandoned the idea of maintaining streams at a drinking water standard and in disregard of the present day aspects of sewage disposal. Sewage purification is essentially oxidation of organic matter. In the wellnigh perfect work of the slow sand filter the oxidation was so complete that it was conveniently measured in terms of nitrification. This is not a true quantitative measure of the whole work of the filter, but appears to be an end-point reaction indicating the completion of the process. With the introduction of rapid methods of purification designed for partial oxidation only, the test of nitrification and the whole scheme of chemical analysis fail utterly to meet the requirements of the situation. Hence the recent development and general use of putrescibility determinations. From a stream pollution aspect the older analytical procedure not only fails to define the quality of an effluent, but is actually misleading. Lederer[1] has shown that the removal by sedimentation of 63 per cent. of suspended solids results in an improvement in stability of only 31 per cent. In dealing with oxidation processes and employing as criteria of improvement the decrease of albuminoid ammonia and of oxygen consumed, the opposite effect is noted. A complete removal of the putrescibility of the sewage may be accompanied by an improvement in these analytical values of not over 50 per cent.

In stream pollution studies the condition is, if possible, a more serious one. Here there is no "per cent. removal" with which to cover the uncertainty of the result. We are given a definite statement that the stream in question contains so many parts per million of free and albuminoid ammonia or of organic nitrogen or oxygen consumed. We are expected from his information to draw a conclusion as to the present condition of the stream in question and the possible effect upon it of the discharge of additional sewage either untreated or partially purified. If these analytical determinations do not enable one to distinguish between organic matter in its crude state and this same matter after passage through an oxidizing filter, he would be a wise chemist indeed who could give any proper interpretation to the results of such a stream analysis.

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[1] Am. Jour. Pub. Health, Vol. 2, 1912, p. 97.

In approaching this problem, it is first necessary, as in the case of any measurement, to establish a scale or basis for such measurement. We are not dealing, in stream pollution, with albuminoid ammonia, or oxygen consumed as measured by boiling permanganate. We are dealing with nuisances of one kind or another. Let these be briefly enumerated.

There may be a bacterial nuisance, or danger, if water supplies or shell fish are involved. If so, our basis of measurement must also be bacterial, and not only that, but it must either be directly based upon the kind of bacteria which we desire to avoid, or if indirect, must bear some such definite relation to the undesirable germs that there can be no possible confusion. Even in such a simple matter as this, results of a misleading character are often reported. The total bacterial content of an unpolluted up-land stream, or of a sewage, stored after thorough disinfection, may vary enormously, but such variations have no sanitary significance.

If the removal of dangerous bacteria be one of the purposes of the purification treatment, then and only then is there a logical place for bacterial tests in the scheme of analysis adopted. The technique employed and the interpretation of the results must both bear recognition of an important fact; namely, while the removal of pathogens may safely be assumed to be no less complete then the corresponding reduction of total bacteria, the latter are subject to a subsequent rapid multiplication, not possible with the pathogens. This is especially important in the case of chemical disinfection. The time and place of sampling must be selected to obtain the maximum effect of the disinfectant and the minimum effect of the subsequent increase in normal bacteria.

Again the nuisance may be of purely physical character, due to the deposit of suspended or precipitated matter. Here also the basis of measurement must conform. Quantitative studies of suspended matter have, therefore, a direct bearing, but the ordinary "suspended solids," determined by filtration through paper, is of little interest. The English and German methods of determining "solids capable of settling" give results of more immediate value, for they show at least the present character of the sewage. Methods are still lacking for determining the rate of change in respect to suspended matter. Oxidation changes tend to precipitate soluble and colloidal substances, and sea water has a similar effect. Future research must attack this problem and must also recognize the time element in sedimentation. Strictly it is the "rate of sedimentation," not the total amount of sediment, that must be considered in computations of possible nuisance. Solids capable of settling may be lower in total amount in a trickling filter effluent than in the corresponding sewage but their rate of settling is very much greater. In a stream they would deposit sooner, or would require a greater current velocity to prevent deposit.

The most common and most undesirable type of nuisance is that which may occur in polluted waters because of the exhaustion of the natural purifying powers. We deal here not with mere pollution, which is intentional, but with the determination of the capacity of the body of water to receive and dispose of sewage without the production of unsightly appearances or unpleasant odors. The latter are determined by certain bio-chemical reactions, which in their turn are most definitely related to the supply of available oxygen. These bio-chemical reactions can, therefore, be definitely measured and they constitute a true measure of the nuisance. Moreover, a proper knowledge of this relationship and proper tests of the sewage or of the effluent make it possible to determine in advance the final result of any anticipated pollution.

The actual scale to be used in making this measurement is, therefore, one of oxygen values. The zero point of the nuisance scale may be taken at the oxygen condition of normal unpolluted waters of the particular type in question. The 100 per cent. point of this scale may be defined for the present as the point at which an obvious nuisance exists in the stream. This latter point is indefinite in so far as there is at present no general concensus of opinion concerning it. The available evidence indicates that in slow-moving bodies of water a definite nuisance will result from the lowering of the dissolved oxygen below 50 per cent. of saturation in the summer time. A more definite statement of this matter is not necessary for the present discussion. In each individual case there must be a definite point at which nuisance begins and, wherever it be, this point represents the maximum permissible pollution and is the upper limit of the nuisance scale.

It would seem, therefore, to be a simple matter to define any intermediate stream conditions with reference to these two fixed points, but the matter is not quite so free from complications. The reactions involved are biochemical in their nature. The problem deals with progressive changes not with fixed conditions at any one moment. It requires for solution the establishment of a fixed point and of the direction and velocity of existing changes. The direction of the change may be toward either end of the scale according as the putrefying tendencies or the natural oxidizing agents of the stream are predominant. The former are now capable of exact determination as will be shown. The latter depend upon the physical characteristics of the body of water in question, and primarily upon the possibilities of re-aeration. In a quiescent body of water re-aeration is almost negligible and improvement by this means is at a minimum. In shallow, swiftly flowing streams the maximum effect is obtained. The determination of the magnitude of re-aeration in moving bodies of water constitutes one of the most important fields of future research in stream pollution. Until this matter is placed upon a strictly scientific basis, the capacity of such streams to dispose of organic matter can be known only empirically. The absolute effect of the polluting matter upon quiescent water on the other hand is strictly determinable. The methods which Black and the writer have elsewhere proposed[1] are direct and simple in application. It is assumed in the first place that the well-known mass action law of physical chemistry holds for these reactions, an assumption which has been amply justified experimentally. Moreover, the reaction being a biochemical one is monomolecular. According to the mass action law, the velocity of such a reaction at constant temperature is a direct function of the concentration of the reacting substances, in this case the oxidizable organic matter and the oxygen. The integrated form of the differential concentration of this law becomes, log. $\frac{O}{o} = KtC$, in which O is the initial equation expressing dissolved oxygen, o the final concentration, t, the time elapsing between the two tests, C, the concentration of the organic matter, values are expressed and K the velocity constant of the reaction. For convenience the oxygen in the unit, parts per million or mg per liter; time, in hours, and concentration of organic matter in per cent. of sewage by volume in the mixture or in the stream.

This formulation is not accurate. It is assumed in integrating that C the concentration of organic matter remains constant during the test. This is only approximately true. Therefore, if tests are made at several different concentrations of sewage slightly differing values of the constant K are obtained. No general solution of the differential is possible and it is necessary in each case to employ a dilution approximately equivalent to that which will maintain in practice. In its simplest expression this formula means that over any given interval of time the putrescibility of the material, measured by its ultimate oxygen requirement, is decreased by a stated percentage of its total value at that time. This loss of putrescibility is accompanied by a corresponding loss of available oxygen in the stream, if there be no addition of oxygen from outside. Therefore, if a sample of the effluent in question or of a diluted sewage be stored in a sealed bottle at a definite temperature and for a definite time, the available oxygen, which can be analytically determined, is found to decrease. This decrease will be a logarithmic function of the time. If then the loss of oxygen and the time be noted in the experiment the equation may be solved for K. Having thus experimentally fixed the velocity constant of the formula for the sewage in question it is possible to determine the future course of the reaction at the given dilution and over any desired period of time. Still neglecting the re-aeration factor, the result of any anticipated stream pollution can be determined by simple tests of the sewage itself and by a knowledge of the dilution ratio in the stream. Hence the importance of further information on re-aeration in running waters, or of some empirical measures of the capacity of the stream to purify itself before the problem can be completely solved.

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[1] Report of Col. William M. Black and Earle B. Phelps on the Discharge of Sewage into New York Harbor, New York City, Mar. 23, 1911. Contribution from the San. Res. Lab. of the Mass. Inst. Tech. Vol. VII.

It will be noticed that in this discussion no attention has been paid to the actual quantity of organic matter present, which is usually determined. A small quantity of albuminoid ammonia or organic nitrogen in the form of highly putrescible material, such as fresh sewage, will exert the same influence as a large quantity in some stable form, such as is found in a partially purified effluent. It has even been found that artificial aeration of sewage may reduce its oxygen requirements materially without effecting any change whatever in the ordinary chemical analysis. It is not the quantity of organic matter, but its oxygen requirement which determines its effect upon the stream.

These principles may now be still further applied and in a more definite manner to the old problem of standards for sewage effluents, many bases for which have been proposed in the past. The most common of these is the "per cent. purification" referring to certain of the analytical features. A removal of 90 per cent. of the "albuminoid ammonia" or of the "oxygen consumed from permanganate" is given as a measure of the results of purification. If albuminoid ammonia or oxygen consumed had any definite relation to the nuisance scale which has been described, then their removal would be a definite measure of improvement. As they are found to have no such relation, their measurement can only be misleading.

In any case the total amount of polluting material discharged is the determining factor without reference to any previous degree of purification. One million gallons of crude sewage would work the same harm as two million gallons of half purified effluent, or ten million gallons, 90 per cent. purified. Hence, after a proper measure of polluting material has been established, the absolute character of the effluent and its volume, alone constitute the measure of its effects upon the stream. The expression "per cent. removal" is of interest only in experimental and preliminary studies.

Other standards for effluents have from time to time been proposed. They deal for the most part with absolute quantities but are in general faulty in two respects. Except for suspended matter they are based upon determinations that have no direct relation to the nuisance in the stream and they take no cognizance of the relative volume of stream and effluent.

The oxygen requirement of the liquid in question is the logical starting point for any quantitative statement of results. If this fact be admitted, the resulting solution is self-evident. Take, for example, a crude sewage. Let this be diluted in aerated water in a proportion, let us say, of five or ten per cent. Then let the oxygen of the resulting mixture be determined in one sample at the start and in another sample at the expiration of twenty-four hours. The resulting loss is the oxygen requirement of this mass of the sewage during twenty-four hours at the temperature of storage. A definite proportion of the oxygen requirement of the sewage will have been satisfied. According to the mass action law already explained, the same proportion of the remaining oxygen requirement will in the presence of sufficient oxygen be satisfied during the next twenty-four hours and so on a diminishing ratio until equilibrium is reached. Knowing the form of this reaction curve, however, it suffices to consider it experimentally only during the first period. If the conditions are such that within twenty-four hours the stream in question will have entered the ocean or a much larger stream where ample dilution is provided, the oxygen requirement for 24 hours, as determined, need merely be balanced against the oxygen resources of the stream. It may be, however, that within six hours such ample dilution will be provided, or it may be several days. By use of the formula the net requirement, over any stated period of time, is readily determined. Moreover, it may appear that the dilution used experimentally is not that actually available in the stream. Again within reasonable limits the experimental results can be transformed to meet the practical requirements by the substitution of the proper dilution factor C. In the case of an effluent the procedure is exactly the same. If the effluent be sufficiently good no dilution will be necessary. The loss of dissolved oxygen of the stored effluent will be noted and the oxygen requirement of the organic matter over any period of time and in any other dilution will follow.

Under this procedure it is necessary to look first to the stream rather than to the effluent in the establishment of standard requirements. The stream without re-aeration has a definite quantity of available oxygen. It may be decided that this oxygen supply shall not be reduced to less than 50 per cent. of the saturation value during the warm months. If information is available on the rate of re-aeration, this additional oxygen may be added to the available supply in the computation. In the absence of any such information re-aeration may be left as a factor of safety. Starting with a definite oxygen availability in the stream and with known populations contributing pollution to the stream, the stream's power to purify sewage may be divided per rata among those populations, in actual quantity of oxygen expressed in any convenient unit, such as pounds per day. In each community then, the oxygen requirements of the sewage or effluent to be discharged must not exceed the available appropriation for that community. Allotments of this character must be made also for the future and not for the present. A young, rapidly growing community may have the same rights in the natural resources of the stream as its older and larger neighbor. If purification is to be demanded and if each community be restricted to a definite allotment of the available purifying capacity, then the small growing community may at the start require no purification of its sewage, while its larger sister may reasonably be held to a much more severe standard. As it grows the younger community will gradually use up its appropriation and will be forced to partial purification. It should be the function of the central state authority to determine these allotments and to warn the various communities of the probable requirements of the situation in the near future. From time to time the actual oxygen requirements of the wastes of each community should be determined. This is done simply by testing properly collected samples of the sewage and calculating from the results of this test expressed directly in oxygen terms, and from the volume of sewage, the total oxygen requirement of the sewage in question. That community which may be situated nearest to the ocean has a geographical advantage which allows the use of a shorter time factor. In the case of New York Harbor and its tributary waters for example, a period of six hours suffices in many cases for the ample dilution of polluting material. The cities of Albany and Troy, however, discharging sewage ultimately into the same body of water would have their oxygen requirements determined through a period of weeks.

The matter of temperature has heretofore been touched upon but lightly. In bio-chemical reactions, however, this is a fundamental factor. The condition of a sewage measured by its oxygen requirement has been found to change as much as ten fold between early and late spring. In the warm weather also water carries less dissolved oxygen and the biological activities upon which all these results depend are enormously increased. Therefore, in all this work, summer conditions of temperature and stream flow must be considered. It is useless to make calculations under any other conditions. If summer conditions are adhered to the results will be satisfactory throughout the year. In determining the stability of a sewage or an effluent in the laboratory the work should be done at a temperature of approximately 20°. Higher temperatures have been suggested and in routine studies of sewage effluents these may be used with the understanding that they are indirect and must be frequently checked against the 20° result. All final expression of oxygen requirement must be referred to the 20° temperature, which most nearly approximates the summer temperature of streams. Not only is the velocity of the reaction increased at higher temperatures but the character of the active organisms is altered and there is no necessary constant relationship between the results at these two temperatures. Results can be obtained in a much shorter time at 37° and if these be frequently checked against the standard conditions their use is permissible.

In advocating this direct method of treating stream pollution problems, the writer makes no claim to originality, except in that he has brought together methods and ideas from various independent sources. The mathematical treatment of the subject is one familiar to physical chemists. The analytical methods that are advised have long been used.

In 1870, Doctor Edward Frankland published detailed experimental results based upon the analytical determination of oxygen absorption in incubated samples. Frankland states[1] "Whether we examine the organic pollution of a river at different points of its flow, or the rate of disappearance of the organic matter of a sewage when the latter is mixed with fresh water and violently agitated in contact with air, or finally *the rate at which dissolved oxygen disappears in water polluted with 5 per cent. of sewage*, we are led in each case to the inevitable conclusion that the oxidation of the organic matter in sewage proceeds with extreme slowness: . . ." (The italics are mine.)

Frankland also refers to similar work by Sir Benjamin Brodie, published in 1886,[2] Spitta[3] in 1900 published two papers upon the self-purification of streams. He showed that in a polluted water, incubated, the oxygen absorption was dependent upon the availability of the organic matter as a bacterial food. He experimented with asparagin, ammonium-lactate, urea, dextrose, and cane sugar. Spitta makes no claim of originality for the analytical procedure which he uses and which is identical with that proposed here. He refers incidentally to similar work by Gerardin, 1875[4] and by Reichard, 1875. Letts[5] reported similar experimental work without making special comment on the analytical methods employed, which were evidently not new with him, and Adeney,[6] McGowan[7] and various other workers of the Royal Sewerage Commission of Great Britain have used the same methods. The use of oxygen absorption as a measure of the character of organic matter, is a matter of so long standing and of such general common knowledge that citation of original authority is as unnecessary as claim of originality would be futile. Nevertheless, Clark [8] points out that the method which is here proposed for dealing with this general problem and which was first published in the report on New York Harbor, previously referred to, cannot be original since he made oxygen absorption tests in 1900, and that so far as he is aware such tests were original with him. It is perhaps unnecessary to add that this well-known method of investigation is merely a useful tool in the work which is here proposed. The first serious suggestion to utilize oxygen absorption as a criterion of sewage strength and of the work of a filter, so far as the writer is aware, was made by McGowan[7] although Adeney[6] had paved the way for this suggestion by a most elaborate experimental investigation. In this country Hoover[1] has made the first successful attempt to apply these suggestions in practice.

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[1] First Report, River Pollution Commission of 1868, p. 21.

[2] First Report, River Pollution Commission of 1865, Vol. II, p. 49.

[3] Arch. of Hyg. 38, 1900, p. 215.

[4] Compt. Rend. 1875, p. 989.

[5] 5th Report Royal Sewerage Commission, App. VI.

[6] Proc. Royal Dublin Soc. IX, 1900, p. 333.

[7] 5th Report Royal Sewerage Commission, App. IV.

[8] Mun. Journ. XXXI, 1911, p. 429.

The writer had endeavored to broaden the scope of these general principles and extend their applicability to stream pollution problems in general. The view that we are dealing here with a definite set of chemical reactions, and the establishment of the fundamental chemical law by which those reactions proceed, seems to be essential to the full extension of the chemical work, and to a complete treatment of the results. The writer's earlier work on the methylene blue test [2] was based upon the same fundamental conceptions and the general adoption and satisfactory application of the relative stability number thus derived testifies to its soundness and value.

The formulation of the chemical law involved, in its differential form, is for all practical purposes an exact one. Owing to the varying possible relationship between oxidizability on the one hand and oxygen on the other, no general integration is possible. The assumption of a constant oxidizability during the progress of the test is reasonably approximate, and becomes more nearly true with increase of oxidizability, and shortening of the period of incubation. It becomes less accurate, therefore, in the case of well purified effluents, and is most available with sewages. Work is now in progress by which it is hoped to place this matter upon a more accurate basis.

The formula which is here proposed has been used in investigations of the pollution of New York Harbor with gratifying results. Determinations of the oxygen requirements of the sewage of one of the main outfalls of Brooklyn were made during an entire summer season. Upon the basis of these figures, of the contributing population and total flow in the area studied, and of an assumed contributing populations over all areas tributary to New York Bay, the actual withdrawal of oxygen from the various large subdivisions of the Bay was calculated. The resulting figures were further slightly corrected for re-aeration after a careful study of that problem. The results of these computations are shown below, side by side with the actual determinations made the following year by the Metropolitan Sewerage Commission. The Sewerage Commission's figures were obtained by careful study of certain cross-sections during various stages of the tide.

Dissolved Oxygen in New York Harbor Waters.

A. Calculated by Black & Phelps, February, 1911.

B. Analyses by Metropolitan Sewerage Commission for the year 1911, Reported August 1, 1912.

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[1] Eng. News. 65, 1911, p. 311. 68, 1912, p. 451.

[2] U. S. Geological Survey, Water Supply Paper, 229, 1909.

	Per cent. A	Sat. B
Lower Bay:		
End of flood,	100	100
End of ebb,	71	74
Upper Bay:		
End of flood,	76	79
End of ebb,	54	55–56
Hudson to 96th Street:		
End of flood,	54	56
End of ebb,	48	54
East River Mouth to Hell Gate:		
End of flood,	53	55
End of ebb,	71	57
Hell Gate to Throg's Neck:		
End of flood,	71	57
End of ebb,	81	86

Our computations refer to the areas indicated in the table, while the Commission's figures are necessarily for cross-sections. In each case the value for the area in question at the end of the flood is compared with the average figures for flood and ebb at the cross-section down stream from the area in question; and at the end of the ebb with similar values for the cross-sections up stream from the area in question. In the single case of the Hudson River to 96th Street at the end of the ebb there were no up stream data available. The figure given is the average value for the ebb flow at the mouth of the Hudson. Obviously the character of water remaining in this section at the end of the ebb is worse than the average ebb flow, a fact which is indicated in the discrepancy of these two figures. With one single exception, the remaining figures show a striking agreement. There is evidently something wrong with our values at the region of Hell Gate, which has influenced the computed value of the ebb waters below Hell Gate and the flood waters above. It might be suggested that there is an influence of the Harlem River shown here which was not properly taken into account in our computation.

The agreement between the computed and the actual values, although gratifying, is of itself of little practical moment. Its value lies in the fact that it demonstrates the substantial accuracy of the methods which have been used in the analysis of this problem and makes it possible to use this same method in computing the probable effect of further increase in population, or of the discharge of additional quantities of sewage from regions not now tributary to New York Harbor. In this way the writer has computed the effect of the discharge of sewage from the proposed Passaic Valley sewer and the satisfactory results shown above give reasonable assurance that these computations, based upon the same general formula and hypotheses, are substantially accurate.

SUMMARY.

Bacterial tests may be used to measure the results of disinfection treatment, whether it be by biological or chemical means. Determinations of "solids capable of settling," including matter that may be precipitated, and especially the "rate of sedimentation," are needed when sedimentation is a factor in stream pollution.

The quantity of organic matter present in a sewage or effluent or in a polluted stream is in no sense a measure of the effect of that organic matter upon the stream. That effect can best be measured and expressed in terms of oxygen requirements. Since the oxygen reactions are progressive, the statement of oxygen requirement must be made for a definite period of time. This requirement may be determined experimentally in the laboratory by noting the rate of decrease of dissolved oxygen in an incubated sample, diluted if necessary, and by making the proper substitutions in the mass action formula which has been found to apply to this case. The ultimate oxygen requirement of the sewage of a community expressed in pounds per day may then be balanced against the available oxygen resources of the stream into which this sewage is to be discharged, and the resulting figure will show the effect of such discharge upon the dissolved oxygen of the stream. If the effect is to reduce the dissolved oxygen of the stream below the permissible point, further purification is indicated. If two or more communities are contributing to the same body of water the total oxygen of the water may be apportioned in an equitable manner between them. In all these computations, summer conditions of temperature and stream flow must be assumed and in each individual case the time factor of the formula must be made to correspond with the time required for the body of sewage in question to become sufficiently diluted in an increasing volume of water to carry it safely beyond the danger point. The examination of crude sewage is of value in experimental studies of purification methods but the absolute quality of the effluent alone effects the stream, regardless of the relative improvement.

Chemical analysis of a sewage or effluent conveys no information that is at all commensurate with the labor and cost involved. The interests of economy and scientific accuracy demand that the routine analysis be replaced by tests, having direct bearing upon the particular case, and interpreted in the light of full knowledge of the volume and physical and chemical characteristics of the body of water into which the effluent flows.

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THE SKILLED SUPERVISION OF SEWAGE PURIFICATION WORKS.

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Read before the Sanitary Engineering Section, American Public Health Association, Washington, D.C. September, 1912.

Introductory Statements.

This paper is not intended to be more than a rough outline of facts which obtain relative to the necessity for skilled supervision over the operation of sewage disposal works.

The term "sewage," in the sense used, applies to all domestic and manufactural wastes conveyed away from the premises by water carriage.

The terms "sewage purification plant" or "sewage disposal works," as herein used, apply only to works designed and built for the treatment of a considerable quantity of sewage. Night soil disposal and percolating cesspool methods are not included, neither is a sub-soil irrigation lay-out, unless it be of sufficient size to demand the services of an engineer to design and construct it. Sewage works may also include the sewers of a system.

For purposes of discussion, sewage disposal works may be divided into four classes; first, the town plant to serve the city, borough, township, village or hamlet; second, the hospital or institutional plant; third, the plant for a private estate; and, fourth, the plant for the industrial establishment in which trade wastes are handled.

Also for convenience it is premised that the sewage works have been properly designed and carefully built and are capable of performing the work put upon them, provided the plant be properly operated. The majority of plants are not properly operated, nor properly designed and built.

With respect to all four classes of plants, it will be agreed that lack of attention to the proper operation thereof will result in failure, sooner or later. In consequence there may follow a nuisance or a menace to health, or both; but always a failure means a waste of money. It will also be agreed that attention to the operation of sewage works if applied with lack of comprehension of the principles involved is more than likely to result in failure and waste of money. These conclusions apply with particular force to the town and trade waste disposal works; to town sewage works because of the large volume treated, the extensive scale upon which the works are laid out and the far-reaching results likely to accompany mismanagement and failure; and to trade waste disposal works because it would be the height of folly to employ expert chemical engineering and provide a plant for the treatment of the peculiar wastes in any instance, whether the object be a sanitary accomplishment or a profitable reclamation of ingredients, or both, and then to neglect to give it the necessary expert attention thereafter.

The citizens of many of the states of the Union have determined it to be good public policy by statutory regulation to provide for the abatement of nuisances and the protection of water supplies and in the furtherances of this policy to establish central control of water and sewage works. What can be the sense in enforcing these laws where the constructing of sewage purification plants is involved if such plants when built are not to be efficiently operated and maintained?

NEGLIGENT OPERATION OF SMALL PLANTS PARTICULARLY NOTABLE.

Now with respect to the hospital or institutional plant and the plant for a private estate, while it is true of both that neglect in operation speedily results in a nuisance, it is particularly true of a private estate. Engineers of high reputation avoid and not infrequently refuse absolutely to have anything to do with the designing or building of a sewage disposal plant of this class. Where there is positive assurance worthy of acceptance that the plant will be faithfully operated, the engineer may furnish the plans, superintend the construction, and, leaving written instructions covering operation, depart feeling reasonably certain that the results will prove satisfactory to the owner and to himself. This exception is a rare one. Usually the plant is neglected, failure comes, the engineer is blamed and the profession suffers. No wonder then that an engineer careful of his reputation is cautious about having anything to do with disposal works for private estates and that this class of service has been taken up largely by contracting firms and corporations. Companies of this kind have circulated descriptive pamphlets of sewage disposal works adapted for private estates or hospital installation. Thousand upon thousands of such works have been built under guaranty of successful operation; but this guaranty may be fixed to expire well within the period subsequent to which a failure is inevitable. In consequence not a fatal but a serious blow has been delivered against the popular acceptance of modern methods of sewage purification. Prominent citizens because of unhappy experiences with the disposal of sewage on their own estates, have exerted their influence with voters against the proposition to increase the municipal bonded indebtedness to defray the cost of building a system of sewerage and sewage disposal for the town.

WHAT PROPER ATTENTION FOR EACH CLASS OF PLANT MAY EMBRACE.

It is feasible for proper attention to be given to the operation of all four classes of plants; it is also feasible to provide constant skilled attention for the town and industrial plant, but it is not necessary for the hospital or institutional plant, or for the plant on the private estate.

For the private estate, an occasional inspection by an expert and his written instructions to the owner or operator should be sufficient.

For the hospital or institutional plant, occasional inspection by the expert, supplemented by such supervision as he may give in writing after looking over the reports of daily operations of the plant furnished to him weekly or monthly by the attendant in charge should be sufficient. Under such supervision, an attendant of ordinary intelligence should be competent to secure satisfactory results. By this system of skilled supervision over the work of the daily attendant in charge, all the care necessary may be provided. The frequency of the expert's visits and of his perusal of the reports of daily operations, and the nature of his written instructions must depend upon the size of the plant, its type and location.

For trade wastes disposal it is quite probable that the situation may demand an expert in charge.

For the town plant (which class covers a range from the real-estate development scheme—in its beginnings perhaps properly belonging to the institutional class—to the sewage works for the largest city), where the works are for a large municipality, constant expert attendance, a laboratory and the making of daily tests and records are required. It is a question where the line should be drawn between works demanding constant skilled attention and those demanding no constant skilled attention. This question must be arbitrarily determined. The type of plant, the work to be accomplished—whether the object be the prevention of a nuisance or the protection of a public water supply—the size of the work and amount of money involved, all are factors of greater or less value, varying at different sewage works, which must be considered in reaching a rational conclusion as to whether skilled supervision shall be constantly employed on the premises.

For a small town plant, situated on a small stream above a water works reservoir or intake, where the high degree of purity demanded and, where the local topography and geological formation precludes the use of any but works of the type that easily fluctuate in efficiency 40 per cent. on temporary neglect or oversight in operation, it is obvious that responsible skilled supervision must be employed.

The same is true with respect to the plant for the village or hamlet; but in these latter places the amount of money involved is small and the financial ability of the users of the sewers would be proportionately overtaxed were a skilled attendant to be constantly employed on the premises. Hence, satisfactory results must be secured in some other way. It is not alone a question of efficiency in results but also a question of finance.

In small communities the question as to the feasibility of sewers at all is involved. Possibly, cesspools and privy vaults and control of night-soil disposal are methods more practicable.

On the other hand, there might be a large town amply able to employ constant expert service where the object of the sewage works—the prevention of a nuisance—involves largely the question of sludge disposal. In a type of plant adapted to the accomplishment of this object, the kind of expert supervision over the man in daily charge required for the individual estate may be sufficient.

Why Skilled Supervision Should be Compulsory.

The question whether constant skilled supervision shall be employed must be determined by the local authorities primarily, or if such constant supervision be necessary, though lacking, then the state authorities must have power to compel its employment, by the municipality, the corporation or the individual. If the state exercises its power to compel this service then it follows that it might well exercise power to regulate the minimum compensation of the skilled employee, to assure the class of service demanded.

In most states there is no such thing as legal engineering or state supervision of engineering or of the relation of the engineer to the Commonwealth, a fact discreditable to the profession in the minds of many of its members and in public estimation.

Take for example the case of water works management. Until recently the courts seemed to support water companies in the contention that a reasonably pure and wholesome water meant the best water obtainable in its natural condition. But the art of treating and purifying water to render it reasonably safe for domestic uses has advanced to such a stage that municipal and private corporations engaged in water works business are compelled now to take cognizance of these facilities. However, a water filtration plant is subject to breakdown. Furthermore, even if it be properly designed and built, yet by careless operation and negligent maintenance a partially purified water may be admitted to the water works system and in this manner and because of this possibility there is a risk and menace to public health where the source of supply is polluted with sewage. As a rule mechanical water filter plants are not operated by men trained for the purpose. Is it sufficient that the town authorities or the company that furnishes a polluted water to the public shall be convicted of committing a crime punishable by a severe penalty where such occurrence could have been avoided by reasonable precautions? No! most emphatically *no!* The people want protection—not penalties—and it is for the people to determine whether by law it shall be compulsory to place in responsible charge of water works and sewerage systems and sewage disposal plants men specially trained for the purpose. Our technical schools and universities are turning out graduates qualified to assume these duties. It is within the power of the legislature to place under the control of the proper state department the regulation of the class of attendants put in charge of these works.

Building contractors, plumbers, manufacturing corporations, railroad and transportation companies, doctors and lawyers are under state regulation. The engineer alone remains without the pale of state control. There is no argument whatsoever in support of this situation if the regulation of affairs of other professions and trades be good public policy. There is a growing sentiment in several states in favor of the enactment of law, and it should be as uniform as practicable, making it compulsory for public authorities having charge of water works, sewerage systems and disposal works and other public works, to employ on those works only such engineers and attendants as have been certified by the state as competent. Why so many comparatively trivial matters should be regulated by state law and yet so important a thing as the constructing and operating of water works and sewerage systems and disposal works, dealing as they do so intimately with the health of every individual of the town, has meantime escaped the attention it demands, is accounted for perhaps very largely by the fact that engineering is a new profession and that it has had hardly time to ponder the problems of its own existence as the older professions have done.

STATE CONTROL INDISPENSABLE THOUGH SUPPLEMENTARY IN CHARACTER.

It is settled then that there must be more attention given to the operation of sewage works if efficiency and economy are to be achieved, that either constant skilled supervision or occasional skilled supervision is required, and that state control to some extent is indispensable. Hence the question arises how far should the state go in exercising supervisory power over the operation of sewage works.

In a number of states sewage purification works are rarely built except under compulsion. In Pennsylvania the commissioner of health decrees, under agreement of the governor and attorney-general, when sewage works shall be built and the municipality, corporation or individual, recipient of the decree may appeal to the courts from the decision and decree of the state authorities, and the order of the court is final. The point I wish to make is, however, that the initiative rests with the state health authorities, men fitted by training and experience determine what is prejudicial to the public health and wherein the interests of the public health must be conserved, since no other than men of this type are competent to perform this professional service. To offset the possibility of arbitrary judgment becoming tyrannical, appeal to the courts is provided, but whether or not the court be the final agency through which the power is exerted is immaterial; back of it all is the police power of the sovereign state which can compel the building of sewage purification plants and can be extended to regulate the supervision of their operation, in order that they shall accomplish the object for which they were built.

If the owner of the plant chooses to employ constant skilled attendance, where occasional skilled supervision would be sufficient, that is his own concern only, but where the said owner refuses to employ any proper attendance whatsoever he must be compelled to do the necessary thing and the state, in exercising this extension of its police power intelligently, must base its decisions on facts and information collected through systematic oversight of the operation of sewage works, this oversight being supplementary to, but not a substitute for, that which the owner of the plant should employ.

The sewage disposal expert is not hindered in his service under this method of state control, but his professional interests are aided and abetted thereby. Up to this point there should be no debate as to policy; but beyond this point each state must work out for itself how far it shall go in this work of supervising the operation of sewage purification plants and in establishing standards of operation and reports.

STATISTICS OF OPERATION THE FOUNDATION OF EFFICIENCY AND ECONOMY.

It is indispensable to the general welfare to know just how and where money-waste with respect to sewage works is occurring and whether it is on the increase or decrease. Such knowledge can come only from statistics. It is the duty of citizens everywhere to stand for efficient registration of data relative to sewage disposal operations. Sanitary engineers, above all others, should make themselves conversant with statistics and the science of their interpretation.

The opportunity to reduce waste of money in installation and operation methods respecting sewers and treatment of sewage is extensive enough to amount to a pressing demand.

It is pertinent to remark that in no department of public hygiene has more rapid progress been made in the United States than in the introduction of pure public water supplies in cities. Undoubtedly the old-time well, spring and cistern waters of the town, abounding as they did in sewage pollutions ofttimes, caused more sickness and death than any other one medium of transmission of infection. Statistics relative to morbidity and mortality from all causes, gathered by local, state and national bureaus are accepted as necessary. Why not the same attitude towards statistics of operation of the public works built to prevent disease and mortality? In at least one state the owner of sewage works is required to keep a register of daily operations at the plant and to transmit copies thereof every month to the state health department. These data are the very foundation for accurate knowledge. Where such registration is brought to the highest proficiency, the greatest progress in efficiency and economy will occur.

There should be uniform registration of data relative to sewage-works management and operation. To accomplish this result there must be compulsory obedience to the reasonable requirements of law or infliction of a penalty in cases of violation of the law.

One of the important subjects which should be included in a standard curriculum prepared for technical colleges, is statistics relative to water works and sewage works. Their value, the methods of their utilization and the manner in which they touch at so many angles in our complex system of social organization make it imperative that the student of sanitary engineering and of economics should be thoroughly familiar with the subject. The collection of these data is a public duty and this implies and emphasizes the necessity for skilled supervision of sewage purification works.

Chemical and Bacteriological Data Necessary.

So we see that where skilled supervision is, there is collection of data also. Should there be chemical and bacteriological analyses as a part of the statistical data of operation? Yes, from a general standpoint; but both should be dictated as to nature, extent and frequency, by local conditions, of which there is a wide range.

By whom should these laboratory tests be made? Naturally the state should make some tests directly and others indirectly by regulating what a local laboratory report should cover. The town laboratories erected at or maintained in connection with the sewage works and other municipal departments would naturally be employed also. The private laboratory may be called into requisition, as at an institution or occasionally for the individual plant owner, or the small town.

The type of plant and local circumstances must determine the kind of test to be made.

(a) For instance, where the problem is one of sludge disposal and the dilution of the liquid to obviate a nuisance, physical tests should be made daily, weekly, or monthly, to determine the amount of suspended solids in the raw and settled or treated sewage, measurements of the volume of sewage treated and of the river or body of water into which the effluent goes should be made and also simple chemical and bacteriological tests to roughly indicate the work performed by the artificial process as a practical aid to Nature's process of purification in the river.

(b) Where the object of the plant is to protect a public water supply, more data are required. Chemically, it is desirable to know, with respect to the solids treated, the amount suspended in the raw sewage and the amount removed therefrom—first, in the tanks; second, in the filters; third, in the resettling tanks; and the amount remaining in the effluent, if any; also the condition of the solids, whether organic or mineral, putrescible or inert.

With respect to the liquids treated, it is desirable to have bacteriological analyses of the raw sewage, of the filtrate and of the effluent from the plant. Presumptive tests are not sufficient; actual counts must be had for comparative purposes. Often local conditions must determine whether to examine the raw sewage or filtrate, but it is always important to examine the final effluent. It is usually helpful to know the efficiency of the filters, tanks and sterilizing process, as units. There should be colon determination for the final effluent, also putrescibility tests whenever a chemical germicide is used.

Not infrequently at institutions and hospitals is to be found a laboratory easily adapted by the resident chemist or pathologist for sewage analyses. This scientist can make the simple tests at the plant daily and the more complex ones less frequently; but for the private estate simple chemical and bacteriological tests every month may be sufficient. Local conditions must control.

For the town, the simple tests should be made daily and the more difficult ones daily, weekly, or as advisable, depending upon the size of the works and other controlling circumstances.

For trade wastes disposal, the whole object sought may be the profitable reclamation of ingredients, or it may be largely a matter of avoidance of a nuisance, or it may be directly or indirectly the protection of the public health; directly, as where anthrax infection of a public water supply comes from a tannery; indirectly, as where paraffin, or creosote, or acid, or coloring material, in raw water operates to render water filters inefficient to the prejudice of the public health, thus interfering with a necessary and important and all-essential use of waters that in their natural state are potable.

CONCLUSIONS.

The art of water purification is not keeping pace with the increasing pollutions of the sources of water supply in some districts of certain sections of the country.

There are few real experts in America, or in any other country, competent to approximate an opinion of great value relative to the comparative wholesomeness of different natural waters used as sources of public supply. Do not misunderstand me. There are hundreds of trained minds experienced in water works and water purification competent to give a conclusive opinion as to the relative quality of waters with respect to color, turbidity, softness and bacteriological and mineral constituents, who are perfectly competent to devise works and erect them for the conservation of supplies and for treating turbid or polluted water to render it clear and sparkling and reasonably free from microörganic life; but there their knowledge as experts ceases.

The doctor who observes the state of health of his patient may be a skilled enough diagnostician to reasonably satisfy himself that the water obtained from the public supply is injurious to this particular individual although the majority of the citizens of the town getting the same public supply are apparently not injuriously affected. It is a well-known observation that some individuals, to keep healthy, must have water to drink that is free from much mineral matter, and that other constitutions can stand waters heavily charged with minerals. In a city the number of human beings susceptible to the injurious influences of a hard water may be large and yet escape attention. Generally speaking, foreign matters in natural waters are not useful or helpful to the animal economy. Attempts to neutralize them by the addition of more chemical are countenanced in modern methods of water treatment. The water chemists of the country are a unit in support of the statement that the use of chemical coagulents and germicides in the treatment of public water is not injurious to public health. Probably we can all agree that the natural mineral constituents of a public water supply need not necessarily condemn the source, where there is no choice as to source or potability of the water.

We all would prefer a clear, soft natural water, comparatively free from mineral constituents and organic life. It is impossible to obtain such water in many places, and artificial methods have to be resorted to. The proposition which I submit is that it is better to keep foreign ingredients out of the natural waters, if this can be accomplished by a feasible plan, more particularly with respect to ingredients discharging into sources of supply from industrial operations and sewers. The baneful effects of trade waste pollutions may be readily manifest to the senses of sight, smell and taste. The baneful effects of sewage pollution are sometimes strikingly manifest in a startling outbreak of typhoid or other epidemic of water-borne origin. The bacteriologist will state how many sewage organisms may be found in a given volume of the raw water. He may find the sewage organism in a cubic centimeter, or he may find it present in three, five or ten cubic centimeters. He will not guarantee that the typhoid germ is not lurking in the supply, even though he may not be able to detect it in his sample.

Within the last few years, with increased knowledge attained by observation of the working of water filters of different kinds, has come lack of that absolute confidence previously extant in the ability of the filter to remove harmful organisms. Today, hardly a filter plant in the country is being operated, regardless of type of plant, without the use of chemicals and germicides. If the germicide be not used constantly, it is held in readiness for emergency use, a recognized additional safeguard that the conditions demand shall be afforded to the public health.

It should be sufficient, without exposing the weak points in modern methods of water treatment or the limitations in modern bacteriological technique, for me to commend to your thoughtful consideration the proposition that the public health in districts where the people are supplied with water drawn from streams receiving sewage demands a double safeguard. The first barrier to the spread of the infection reaching the stream as sewage should be in the treatment or control of the sewage at the point of discharge. "Kill the germ in the bed-pan" is the ideal that would wonderfully reduce typhoid-fever, if it were feasible of accomplishment. The next best place to kill the germ is at the mouth of the sewer. The second barrier to the spread of the infection through water-carriage is at the water works intake below, where a treatment plant adapted to the conditions is necessary. It is not sufficient to rely on this water purification plant. It has been demonstrated in Pennsylvania time and again that public policy demands the control of the discharge of sewage into the stream above the water works intake.

Summarizing the foregoing remarks, I have shown the necessity for supervision of sewage purification works of all kinds, and these different kinds have been classified into four divisions. After discussing the possible results of negligent operation of the several kinds of plants, I have outlined what proper attention for each class of plant may embrace. This was followed by reasons why skilled supervision of the operation of sewage works should be compulsory, and I then showed that state control is indispensable, although supplementary in character. The foundation for high efficiency and economy in the operation of sewage purification works must be statistics and I have suggested the scope of these statistics, making special mention of chemical and bacteriological data. The scope of the subject is broad and the enforcement of compulsory skilled supervision of sewage purification works involves the exercise of not only local but also state and national police power. Therefore, it would seem fitting that a committee should be appointed to consider at length the entire subject and to report on standard methods of operation and supervision of sewage purification plants.

DISCUSSION.

Mr. H. P. Eddy, *Boston:*

Mr. Snow has very ably pointed out the necessity of placing the management of sewage disposal works in the hands of skilled employees, wherever this is practically possible, and in other cases the advisability of providing at intervals such skilled general supervision as will insure the successful and wise operation of such plants.

There is one vital difference between the conditions affecting the operation of a water purification plant and the management of sewage disposal works. In the former case, the interest of the operator, or manager, lies in the successful operation of the plant, for any failures of the plant immediately affects the people to whom the management is responsible. If poor water reaches the mains, the consumers—who are the citizens of the community, are immediately cognizant of the fact and the water works superintendent, be he a municipal employee, or the agent of a company, is promptly advised of the unsatisfactory condition of the water supply. It is, therefore, wholly to his interest to provide the very best management for the water works.

On the other hand, the interest in the sewage disposal works is entirely different. Such works are generally located at a distance from the center of the municipality, if they are not carried beyond its boundary lines. The only interest of the citizens who pay for the maintenance of these works is that their wastes be removed with as little inconvenience to them as possible and at the lowest cost. If the sewage purification works break down for any reason, the evil resulting is not usually visited upon the people resident within the municipality, but upon their neighbors down stream, within a different municipality, and possibly beyond state boundaries. The primary interest of the community in the operation of its disposal works, and of the manager in charge of such plants, is to accomplish the necessary result at the least cost. The character of the work done is usually one of secondary importance to the parties owning the plant.

Bearing in mind this distinction between the interests of the community in its water works and its sewerage works, it is easy to see why the management of sewage disposal works is generally far below in efficiency that of water works, and it is axiomatic that this difference will always be more or less apparent. It is primarily because of this difference in interest that the management of sewage disposal works may need some strict police supervision either on the part of state or national boards of health, or indirectly through litigation. Thus far, it appears that litigation has been a very important factor in securing the construction and operation of sewerage treatment works, and it may be that it has been the most effective agent in bringing about the results thus far obtained. This is the only line of action which the injured individual, or community, has readily available, by means of which it can require its neighbor to cease causing objectionable conditions. The other means, which is not usually so readily available, is to invoke the action of the state, or national legislative bodies, to pass such laws and create such boards as may secure from one community the proper disposal of its sewage, so that it may not prove an offense or a danger to another. This latter course is often slow and may require many years to become effective. Fortunately, at the present time, several of the states have endowed their boards of health with sufficient powers to study and report upon objectionable conditions caused by the discharge of sewage, and in a few cases, to require their correction. These powers have not usually been sufficiently comprehensive to include police supervision of the operation of such works, and it is very doubtful if it is desirable that such boards be vested with such arbitary authority. In the opinion of the writer, it is desirable that such boards be given sufficient authority and funds to enable them to examine sewage disposal plants from time to time, and to make occasional analyses by which it may be possible to show definitely what is accomplished. In this way, available data will be accumulated, which can be interpreted by sewerage works managers in some cases, or in others by engineers appointed to assist in the operation of such plants. This method has been adopted by the State Board of Health of Massachusetts and very valuable data have been accumulated during the past twenty or more years. These operation records are referred to very frequently by engineers making studies of sewage disposal problems, both in connection with their studies of the type of plant to be built, and also where they are interested in the efficiency of existing plants. The expense of this work is not great, and it does not throw an undue burden upon the state, or upon the health board.

More attention should be given by the municipalities to the appointment, or selection, of sewage works managers. As in every other official position, men trained in this class of work should be selected to conduct it. The expense of securing such managers will, of course, be too great for many of the small towns to bear. This condition can be met by employing specialists who will take a general oversight of the operation, make occasional visits to the plant, and interpret analyses made by official boards, or their own analyses where the others are not available, or are not made with sufficient frequency. The expense of this latter method, including occasional visits for personal inspection, should not be prohibitive for very small communities, for institutions, or even for owners of large private residences.

MR. PAUL HANSEN, *Engineer Illinois State Water Survey:*

The points brought out in Mr. Snow's paper regarding the necessity for more competent supervision over sewage purification plants cannot be too greatly emphasized. In my experience in the Middle West I cannot recall any small sewage purification plant, that is to say, plants for towns of ten thousand or under, that is being effectively operated. Out of some thirty-five sewage purification plants investigated by the State Board of Health of Ohio during 1907 and 1908 not one when first visited was receiving adequate supervision. Nor was it possible for the State Board of Health through its representatives to persuade the local authorities to adopt the right kind of supervision in any material proportion of the cases. Thorough examinations of the plants and complete instructions left for maintaining the plants in proper condition resulted in a very material improvement, but the improved conditions in most instances lasted only for a short length of time. In some cases, this was due to careless neglect; in other cases, due to changes in officials and employees.

Recently in the State of Illinois I have had occasion to visit six purification plants not one of which was giving satisfactory results. Only one had an operator in charge. This particular operator was somewhat old and decrepit and seemed to pride himself on how little he knew regarding the plant. The responsible authority in this instance seemed to be the superintendent of streets who rarely saw the plant, and the caretaker operated under his orders, doing just as much and no more than he was told to do. While conscientious in his way, his lack of knowledge of the mode of operation of the plant resulted in the by-passing of crude sewage into the stream during a large portion of the time. At another plant a certain amount of attention was given by the street department, but this attention was given solely for the purpose of giving the plant a presentable appearance. The weeds were cut, and the limestone in the contact filter was carefully protected against contamination with sewage, so that they remained pure white and unsoiled. Meanwhile, the sewage was merely passing through a septic tank and then being discharged into a very small stream where it created a very foul nuisance. The other plants were for the most part without any supervision whatever, had fallen into disrepair and were producing poor effluents.

Thus far, no practical way has been brought to my attention for securing proper operation of sewage purification plants except by giving some central state bureau or commission authority over the operation of sewage purification plants (and water purification plants), with ample funds for making their authority effective.

Special emphasis should be given to Mr. Snow's suggestion that many of the smaller plants both for purifying water and sewage may be adequately taken care of by occasional expert supervision such as can be given by consulting engineers. I should like to urge all sanitary engineers in state positions to foster this practice as much as possible not only in connection with water and sewage purification works, but also in connection with water supply and sewerage systems as a whole. Should there be developed a common practice among smaller communities for retaining the services of the consulting engineer, which, by the way, may be done at almost nominal expense considering the benefits derived, we might hope to see these municipal enterprises which in many instances are flat failures and in many other instances extremely uneconomical in operation, placed upon a sound and efficient basis.

THE SLUDGE PROBLEM.

Langdon Pearse,
Chicago, Ill.

Read before the Sanitary Engineering Section, American Public Health Association, Washington, D.C. September, 1912.

To maintain clean waterways, free from general or local nuisance, attention must be paid to accumulations of sludge, since the heavy material coming from sewers and industrial plants will usually be deposited, as soon as conditions permit, in banks of varying extent, which may decompose and give off disagreeable odors, even though considerable dissolved oxygen be present.

The topic here considered is the relation of sludge deposits to nuisance and the cure thereof. The effect of continued discharge of settling suspended matter into waterways will depend on the dilution, the velocity of flow in the water course, the dispersion, and the character of the suspended material. From the standpoint of nuisance, the physical conditions of the place of discharge may be classified (1) where the deposits are always under water and (2) where the deposits are exposed during part of the day, by tides or the lowering of water in a mill-dam. From the hydraulic standpoint the division may be made of (1) velocities sufficient to prevent deposit, (2) depositing velocities, and (3) quiescent conditions. The displacement of a tidal prism is comprised under the preceding heads.

In general, several alternatives are possible for relief, either (1) dredging out the deposits at intervals, or (2) diverting the sewage by a bypass or intercepting sewer and outfall to some point where the discharge may not be objectionable, or (3) preventing the formation of the deposits by the actual removal of the suspended matter by screening, sedimentation, or more thorough purification. To settle the course to pursue, not only the cost but the possibilities of nuisance and the desirability of good appearance must be considered. In other words, effectiveness and cost should be balanced to suit the physical conditions of the locality.

On the subject of sludge accumulations and their effect on the overlying liquid but little quantitative data exists. Most of the recorded observations are qualitative in the sense that many observers report that a great nuisance has existed where sludge banks were permanent and that dredging out the material improved conditions. Considerable attention has been given in many cases to the study of the extent of deposits, as, for instance, the description of the sludge nuisance in the Back Bay Fens in Boston, detailed by Mr. John R. Freeman in his report to the Charles River Dam Commission in 1903. The nuisance there was so marked and the deposits of sludge so large for a small stream (in amount one fourth the entire capacity of the basin) that extensive dredging was recommended and the removal of the sewage by means of sewer extensions. In the case of the Providence River in the city of Providence, R. I., a varying degree of odor has been commented on by the State Board of Health and by the city engineer, Mr. Clapp. Dredging has relieved conditions very markedly although some of the same material still enters the stream. No exact measurements or details, however, have been given.

In the report of the Sanitary District of Chicago, October, 1911, the chief engineer, Mr. George M. Wisner, has described conditions of the fill in the main channel of the Sanitary District and given analyses of the same. The analytical data shows a rather heavy material compared to the sludge found in sewage disposal plants, resembling more nearly a grit chamber sludge than a true sewage sludge. The effect of the sludge on the water passing above in the canal is detrimental although quantitatively difficult to express. From the most marked sludge deposits just above the power house, considerable ebullition of gas occurs in the summer, and even in the winter, which helps in maintaining the oxygen content at a very low level. In portions of the canal near the city studies have been made on the distribution of oxygen in the cross-sections and a difference has been noted between the content at the top and the bottom, the bottom usually being lower. Some variation has also been found between the two banks before mixing is complete, a distance of four to five miles. Where the oxygen content is low the distribution through the section is practically uniform, complete mixing having taken place.

The presence of large sludge deposits and scum in the arms of the Chicago River, known as the Stock Yards slip or Bubbly Creek, is responsible for a condition of nuisance and degree of odor which might not occur to such degree could the suspended matter be kept moving and even partially oxygenated. Dredging has been carried on at times.

In New York Harbor, reference has been made to sludge deposits in the report of the Metropolitan Sewerage Commission and comment has been made on the indications of oxygen in the lower layers of the water through the presence of a reddish surface on the black sludge. This phenomenon indicates the oxidation of the ferrous sulphide. This has also been observed in experiments in the laboratory of the Sanitary District of Chicago where several inches of sludge were placed in the bottom of shallow jars, the liquid above containing oxygen.

A few quantitative experiments, made by Mr. Harry W. Clark, are given in the report of the Charles River Dam Commission, 1903, in which 2 gms. of mud or sludge were placed in half-gallon bottles full of fresh water, or salt, and the reduction of oxygen was followed. In five days the oxygen in fresh water was reduced to an average of 61 per cent. saturation from an initial complete saturation, the extremes being a reduction to 81 per cent. and 33 per cent. saturation. An experiment was also made, with continuous flow, using 9 inches of mud in a tank 12 feet deep, the liquid being at first 5 and later 7 per cent. sewage. In general, the surface layers contained more oxygen. Comment is also made on the production of odors in tidal waters by bacterial reduction of the sulphur compounds in sea water. In the examination of the conditions in the Fens basin, referred to previously, it was found that hydrogen sulphide was formed which rose through six feet of water. No oxygen was found below a surface layer 6 inches deep.

On the absorption of oxygen by sludge some interesting comments have been given me by Mr. Almon L. Fales, supervising chemist of the Sewer Department in the City of Worcester. In 1903, he conducted some experiments on the aëration of sludge and liquid in a tank holding 1,500 gallons and found that in the early period of the experiments it was necessary to aërate several times a day but later once in twelve hours proved sufficient. It was also observed that the dissolved oxygen disappeared much more rapidly in the layer just above the sludge. Occasionally after twelve hours or less had elapsed after aëration the dissolved oxygen would be exhausted in the layer just above the sludge while the top liquid would still contain as high as 25 per cent. saturation. After the experiments had been continued for three weeks it was found that the liquid just above the sludge lost all dissolved oxygen in twenty-four hours while the top liquid showed 125 per cent. saturation. The super-saturation was caused by the propagation of chlorophyl-containing micro-organisms which gave the liquid a greenish tint. Similar phenomenon can be noticed at times in streams of intermittent flow where the dilution is not sufficient to prevent nuisance.

In shallow windswept waters, sludge deposits may prove a greater source of odor, owing to the constant agitation of the waves. An experiment in our laboratory has shown that any disturbance of sludge under water is undesirable from the standpoint of prospective odors.

Of the remedies at hand, dredging seems to be in general but a temporary expedient, aside from its value in cleaning up offensive conditions. It is temporary in the sense that the operation has to be repeated at intervals and does not offer any permanent relief in the intervening period when conditions may develop, according to the amount of dilution, which will produce nuisance. This might roughly be compared to the development of septic conditions in a sedimentation tank between the periods of cleaning. In the case at hand the periods are necessarily long. Unless a hydraulic suction dredge be used and large space be available for the ponding of the sludge, it may be difficult to remove all the material which should be classed as sludge. With a dipper dredge probably only the more gritty material would be removed although conditions may be much improved thereby. The composition of sewage sludge, as found in sedimentation tanks of various types, ranges from a specific gravity of 1.01 to 1.06 and seldom exceeds 1.10, the water content running from 85 to 95 per cent. This is a material which is fairly liquid.

The only permanent remedy is to remove the sources of the trouble or prevent the formation of deposits. The construction of a bypass or an intercepting sewer and outfall may relieve the situation locally, and remove the discharge to a point where further attention may be required in the future. Local consideration will, of course, govern such action. To prevent deposits, the removal of the settling suspended matter is the key. The dilution available, however, may require further treatment. Today screening is available where the areas tributary are relatively small and the sewage fresh, and in case screening be not sufficient, various styles of sedimentation tanks either of the single or double deck type can be used to advantage. The sludge will be retained in them and in addition an improvement of the liquid made thereby of added benefit.

It is difficult to state any hard and fast criterion that will cover all cases. The amount of dilution affords one key. I would suggest, that where a stream is large and the dilution great, so that oxygen is always present to a high degree except in the vicinity of the sludge banks, dredging may prove an appropriate remedy. This is particularly true when the velocities of flow are sufficiently high to keep the settling material moving at other points. Possibly the deposits might be removed and their place filled with a fine, inert material, such as gravel or sand, in order to keep a uniform cross-section and to prevent the formation of banks in places of low velocity.

Where the oxygen content is low, particularly in the summer time, and even exhausted, it would seem as though the dredging of sludge deposits was at best but a temporary expedient and strictly of benefit only as a stream cleaning process, preparatory to putting in operation efficient settling tanks or screening devices which will remove the settling suspended matter. There lies the permanent remedy.

The question of cost is largely dependent on local conditions, and in many cases the relative costs of the methods outlined may not control, since conditions of nuisance frequently must be removed and prevented at any reasonable cost. Comparison, on the basis of the cost per cubic yard of dredging and of sludge collected in tanks, is difficult. Roughly speaking per cubic yard of material handled, dredging has the lower cost price. The total annual cost per cubic yard of sludge collected in a sedimentation plant, with Emscher tanks, would be considerably higher. The effectiveness and scope for application of sedimentation plants is, however, quite distinct from that of dredging.

The conclusions are:

1. Sludge deposits may form, when velocities of flow are low.

2. The effect of sludge deposits is governed somewhat by dilution. Nuisance may exist locally, even though the dilution be very great.

3. Sludge deposits will use up oxygen from the supernatant liquid.

4. Three remedies are available, dredging, bypassing the locality, and the removal of suspended matter before discharge.

5. Dredging is efficient as a cleaning-up process. It is not a permanent remedy, in that it may not reach all material, and is executed at infrequent intervals.

6. Bypassing the locality is a temporary expedient, which may relieve present conditions and perhaps cause trouble later elsewhere.

7. The removal of suspended matter by screening or sedimentation is effective, and of permanent service.

8. Screening will remove the coarser material, the results depending very largely on the character of the sewage.

9. Sedimentation will remove practically all the settling suspended matter.

10. Effectiveness and cost must be balanced to suit physical conditions.

SOME OBSERVATIONS ON THE FORMATION OF HYDROGEN SULPHIDE IN SEWAGE.

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Read before the Sanitary Engineering Section, American Public Health Association, Washington, D.C., September, 1912.

When sewage undergoes anaërobic decomposition it releases hydrogen sulphide gas in varying quantities, often sufficiently large to be noted by its characteristic odor. The odor ordinarily found at sewage purification plants is probably due in most part to decomposition products others than hydrogen sulphide, such as ammonia, indol, skatol, phosphine, methyl merkaptan, phenol, phenylacetic-, phenylpropionic-, acetic-, butyric- and valerianic-acids and other compounds. In a general way we are aware that absence of air will favor the formation of these malodorous products of putrefaction, while in the presence of air decomposition may go on without any odor whatsoever, ammonia and hydrogen sulphide being at once oxidized to nitrates and sulphates.

Hydrogen sulphide may be produced from protein by purely chemical methods, such as fusion with caustic potash or by bacterial activity. In sewages the formation of the gas is largely due to bacterial action on the protein matter, this formation being similar to the formation of free ammonia, but the oxidation of hydrogen sulphide seems to depend much more upon chemical influence than in the case of ammonia.

The formation of hydrogen sulphide in sewages as derived from inorganic sulphates, first thoroughly studied by Beijerinck[1], has been demonstrated on numerous occasions to be altogether of bacterial origin. Sufficient data are not available as yet to form a definite opinion on the importance of the development of hydrogen sulphide from inorganic sulphates in sewage disposal plants. Recently Barr and Buchanan[2] reported large quantities of hydrogen sulphide in three sewage disposal plants, in which the sewage was very rich in sulphates. A specific organism, similar if not identical to the Spirillum desulphuricans of Beijerinck, has been isolated by these observers. H. W. Clark[3] observed the reduction of sulphates in sewages and so have a few others. A typical sulphate reduction also takes place in the "biolytic" tank (modified Dortmund tank) at the sewage testing station of the Sanitary District of Chicago, but no specific organism has been isolated as yet. Specific organisms, taking part in the formation of hydrogen sulphide from sulphates were observed also by Zelinski[1], Letts[2] and Van Delden[3]. Holschewnikoff[4] isolated a bacillus—the *bacterium sulphureum*—which was in his opinion a sulphate reducer. He claims to have found an increase in hydrogen sulphide on the addition of sulphates, but quantitative proof is lacking. He also obtained a strong hydrogen sulphide reaction on the addition of thiosulphates. However, this is a common property of many other bacteria.

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[1] Centr. Bakt. Parasitenk. 1895, Abt. II, vol. 1, p. 3.

[2] Iowa State College, Engineering Experiment Station, Bulletin 26.

[3] Report of the Massachusetts State Board of Health, 1903, p. 251.

Zelinski's description of the *bacterium hydrosulphureum ponticum* is interesting, inasmuch as he claims that the sulphates were decomposed under anaërobic as well as aërobic conditions. Salkowski[5] in investigating the source of the development of hydrogen sulphide in urine states that it is possible that sulphates might be the source of its formation but certain conditions must exist, which he has not been able to elucidate. Huppert[6] admits that hydrogen sulphide can be formed at a fairly high temperature from sulphates in the presence of organic matter. Nadson[7] rather recently described a reduction of sulphates in the presence of peptone under anaërobic conditions employing pure cultures of proteus vulgaris. Hoppe-Seyler[8] ascribes the sulphate reducing property to methane in the status nascendi. Petri and Maassen[9] accepted nascent hydrogen as responsible for the reduction. Murray and Irwine[10] held that the reduction is due to the protoplasmic carbon of some microörganisms, which first forms sulphides. The sulphides are acted upon by carbon dioxide and hydrogen sulphide is eventually formed.

There are a number of sewage purification plants in this country in which sulphate reduction has been noted, but little work has been done on the causes underlying this interesting phenomenon. It is safe to conclude that specific organisms fill a very important part in the process and that the formation of hydrogen sulphide from this source is to be clearly distinguished from the hydrogen sulphide accompanying putrefaction. For practical purposes it is immaterial from which source the hydrogen sulphide is being derived inasmuch as it draws impartially on the available oxygen of the stream into which it is discharged. The nuisance due to sulphate reduction is particularly apt to occur in sewages rich in mineral sulphates, such as iron sulphate derived from pickling liquors. In one case the total mineral sulphates in the crude sewage of the testing station in Chicago amounted to 23.2 p. p. m. of Sulphur (S), while the equivalent portion leaving the "biolytic" tank, in which sulphate reduction is marked, showed but 1.3 p. p. m. of S. On passing the effluent, which had the typical "rotten egg" odor, on to a sprinkling filter, the sulphates again increased to 7.6 p. p. m. of S. The filter was covered with a silk-like growth of beggiatoa, which are very rich in S granules and their oxidizing ability can be readily judged by the result spoken of. Similar results have been obtained on other occasions. The effluent of the sprinkling filter has been very rarely putrescible although the influent contained at times as much as 40 p. p. m. of hydrogen sulphide. The same sewage, which lost the greater part of the sulphates in the "biolytic" tank, showed only a slight reduction in the common, old style septic tank. The iron present has, of course, become combined with the generated hydrogen sulphide and the soluble sulphides so that there were but traces of iron left as a rule in the effluent of the "biolytic" tank, although at times for very short periods the sewage carried as much as 100 p. p. m. of iron (Fe) and more. The precipitation of the iron salt by the hydrogen sulphide resulted in an effluent, which was particularly clear and low in colloidol matter but on storage free sulphur precipitated shortly. The active reduction process in the "biolytic" tank is accompanied by and perhaps stimulates the reduction of organic nitrogenous and carbonaceous matter, as borne out by the analytical data obtained. Altogether the observation points conclusively to specific bacterial action.

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[1] Proc. Russian Phys. Chem. Soc., vol. 25, (5) 1893.

[2] Proc. Roy. Soc. Edinburgh, March 4, 1901.

[3] Centr. Bakt. Parasitenk. 1903, Abt. II, vol. 11, p. 81.

[4] Fortschritte Med. vol. VII, 1889, p. 201.

[5] Berl. klin. Woch. 1888, p. 722.

[6] Neubauer and Vogel 8th Edition p. 197.

[7] Handbuch der Technischen Mykologie, vol. 3, p. 126 (Omelianski's article).

[8] Z. physiol. Chem. 1886, vol. 10, 401.

[9] Arb. kais. Gesundh. 1893, vol. 8, p. 490.

[10] Trans. Roy. Soc. Edinburgh 1893, vol. 37, 496.

It seems of interest to investigate the rôle which some well known sewage bacteria and pathogenic bacteria might play in the reduction of sulphates in sewages or artificial sulphate media. Experiments along that line have in the past been extremely disappointing except in the very few cases in which it has been possible to isolate or identify a specific organism hitherto unknown. Fitz[1] cultivated a large number of bacteria without getting a trace of reduction on adding sulphates. Rubner[2] observed that bacterial cultures in bouillon or peptone bouillon may actually increase the quantity of sulphates. In some of his experiments the sulphates remained intact. In other cases the sulphates became diminished until they could not be determined but the decrease was not accompanied by the formation of hydrogen sulphide. The presence of sulphates did not seem necessary, however, when organic sulphur was present.

After experimenting with a large number of artificial media containing sulphur in the form of inorganic sulphates exclusively, I decided on a medium containing ammonium tartrate 10 gms., glucose 10 gms., basic potassium phosphate 1 gm., calcium chloride traces, sodium sulphate

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[1] Chem. Berichte, vol. 12, p. 480.

[2] Arch. Hyg. vol. 16, p. 53.

10 gms. dissolved in 1 liter of water (medium "A"). Another medium employed (medium "B") had the same composition except that 50 mg. of glucose were added instead of 10 gms. It is claimed that if glucose is present in too large quantities, butyric acid fermentation may set in and the hydrogen sulphide reaction may be either absent or very much delayed. As a matter of fact there did not seem to be any noticeable difference in the sensitiveness of the reactions obtained with those two media during my experiments, but where one medium has been employed, "B" was the one resorted to. Some media, containing peptone in addition, have likewise been employed by me. They showed decided hydrogen sulphide formation on incubation with loopfuls of crude sewage, tank effluents, and sludges at either room temperature or at 37° C. This hydrogen sulphide formation is not the reaction of any specific organism, but the mass action of all bacteria preying upon the organic sulphur present in the peptone. Such decomposition is easily accomplished as will be noted later. The tests were qualitative only. However, the same amount of medium and the same size of loop were employed, so that a quantitative comparison of the results is justified. The hydrogen sulphide formation was observed in the first series of tests by inserting strips of filter paper, previously immersed in sterile lead acetate solution, into test tubes, the paper being fastened to the cotton plugs. A little glycerine was used in the preparation of the lead solution, so as to prevent the strips from becoming completely dried out on incubation.

The following cultures were used for incubating the various media: B. coli, B. typhosus, B. enteritidis, B. lactis, aërogenes, B. megatherium, B. mesentericus, B. claocæ, Proteus vulgaris, B. acidi lactici, Proteus Zenkeri, Proteus mirabilis, B. mycoides, Sewage streptococcus, B. ochraceus, Strept. mitus, B. pyocyaneus, B. fluor. non-liquefaciens, B. choleræ suis, rose red coccus, B. prodigiosus, Staphyloc. pyogenes albus, B. anthracis, B. dysentery and B. subtilis. One loopful of these cultures, grown on nutrient Agar, was inoculated into 10 c.c. of the sterile media "A" and "B," containing sulphur in no other form but the inorganic. The cultures were incubated aërobically at 37° C.

Both media gave a negative result with every one of the species except B. cloacæ. B. cloacæ showed a slight but distinct quantity of hydrogen sulphide on the rim of the lead acetate paper, after four days incubation. The liquid showed a decided bacterial growth. B. pyocyaneus and B. fluor. non-liquefaciens also gave a decided growth but no hydrogen sulphide. B. subtilis showed a distinct surface growth and likewise no hydrogen sulphide. A blank experiment was made in each case with sterile tap water as the medium. Chemical tests proved the absence of organic sulphur in the various ingredients employed in making media "A" and "B." Four strains of B. cloacæ were used at one time or another but a positive hydrogen sulphide reaction has not always been obtained. Aërobic incubation gave 9 positive and 5 negative results on 3 to 10 days' exposure. Anaërobic incubation gave 4 positive and 3 negative results on 1 to 2 weeks' exposure. Thirty-seven degrees C. proved more favorable than 20° C. or room temperature. Whenever a reaction failed there was either no growth at all or very little growth noticeable. In positive cases, the longer the exposure the more distinct the reaction developed, but even in the most favorable cases the quantity could hardly be called anything but distinct traces as compared to the amount of hydrogen sulphide generated by a culture of B. cloacæ in a 10 per cent. peptone bouillon solution.

Quantitative investigation to prove an actual reduction of sulphates has not been undertaken. It is doubtful whether such an investigation would even prove successful, since there were never more than traces of hydrogen sulphide formed and unavoidable working errors might have resulted in differences possibly larger than the true differences. Inoculations of B. cloacæ into sterile tap water never resulted in hydrogen sulphide on incubation. I believe that the hydrogen sulphide formation in this case was not due to a sulphate reduction analogous to the reduction occurring with the Spirillum of Beijerinck, but rather that a small part of the mineral sulphate became converted into organic sulphur in the bacterial body, which on decomposition released hydrogen sulphide. It is very likely that some common forms of sewage bacteria take a part in the formation of hydrogen sulphide from the mineral sulphates under specific conditions, which have as yet not been reproduced artificially.

Where the reduction is as marked as in the "biolytic" tank, spoken of before, there can be hardly any doubt of specific action. When I incubated medium "B" under aërobic conditions with a loopful of the sludge from that particular tank, I obtained in a few hours a decided hydrogen sulphide reaction on lead acetate paper. The sludges from two other septic tanks gave a weak reaction in the same period and the sludge from a plain settling tank showed no reaction at all. When the incubation was extended from one day or longer all sludges showed a strong hydrogen sulphide reaction. The sludge from the "biolytic" tank, incubated under anaërobic conditions also gave a distinct reaction in medium "B."

It is also interesting to note that a number of the common sewage bacteria largely retard the oxidation of the black iron sulphide in sewage sludge. Test tubes containing a sterile medium consisting of 10 per cent. sludge in sewage were inoculated with loops of B. coli, B. typhosus, B. enteritidis, B. megatherium, B. mesentericus, B. cloacæ, Proteus vulgaris, Proteus Zenkeri, Proteus mirabilis, B. mycoides, B. pyocyaneus, B. fluor. nonliquefaciens, Staphyloc. pyogenes. albus and B. subtilis. The tubes were incubated aërobically at 37° C. Soon the blank, containing the sterile medium began to change. The black iron sulphide gradually became converted into brown basic sulphate from the top downward. In one week all of the black color had disappeared. The B. cloacæ, B. pyocyaneus, B. fluor. non-liquefaciens tubes, after that time, still showed the black color throughout, but the B. cloacæ sludge began to show signs of oxidation on the surface. Other species showed this effect to a much lesser degree. With some species, as B. megatherium and B. mesentericus, the oxidation proceeded nearly as quickly as in the blank sludge. One c.c. of sewage, one loopful of river mud, sludge from the "biolytic" tank, septic tank and settling tank added to test tubes containing the medium prevented the oxidation of the sludge as long as they were under observation (ten days). However, 1 c.c. of fresh lake water added to the sterile medium quickly changed the black color into brown. As a matter of fact, the lower tube was completely oxidized. Werigo[1] incubated oxidized sterilized mud from the coast of the Black Sea with small amounts of non-sterilized black mud. The gray color of the oxidized material quickly changed to its original black. The black color was due to the presence of iron sulphide. Philippowitsch[2] and Brussilowsky[3] observed that the blackening of that particular sterilized mud took place on incubation with the water from the coast and even river water. They did not consider this reduction process as due to specific bacteria. B. phophorescens and B. typhosus likewise gave a black color in the mud on inoculation.

The question arises as to whether in a sewage purification plant an effluent in which an active sulphate reduction takes place should be looked upon as more putrescible simply because it contains more hydrogen sulphide or not. The old Hamburg putrescibility test, which consisted of the determination of the organic sulphur in the sewage effluents, did not take the inorganic sulphate reduction into account. Possibly the formation of hydrogen sulphide from sulphates is more general than is supposed. I believe a distinct mistake would be made if the sulphates are disregarded. Fortunately Spitta and Welder's methylenblue test permits the normal and abnormal biological processes to proceed on a small scale. The reducing compounds, formed, react no matter what their source may have been. The Hamburg putrescibility test assumed that organic sulphur is the main source of the putrescent decomposition products. Under ordinary conditions, the hydrogen sulphide, released during the putrefactive process in a sewage purification plant, is hardly noticeable and can be detected in the majority of cases only by sensitive, chemical tests. Yet its development is general and proceeds continuously, just as does the conversion of highly complex nitrogenous matter into free ammonia.

That organic sulphur in protein bodies constitutes a source of hydrogen sulphide gas has been known for a long time. Petri and Maassen[1] observed this phenomenon with the B. erysipelatus suis. The work was originally undertaken by these authors with the view to establish, if possible, the relation between the formation of hydrogen sulphide and hog erysipelas, but it has since been found that practically all known bacteria form hydrogen sulphide from protein compounds under certain conditions. The ability to form hydrogen sulphide will largely depend upon the amount of organic sulphur present. The authors mentioned employed a large number of species, most of which were pathogenic to animals. All of the species formed hydrogen sulphide. Rubner[2] also took a large number of cultures and inoculated them into extracts from the thymus, lung, liver and spleen, from which the inorganic sulphur had been removed. Hydrogen sulphide has been obtained whenever the growth was strong. Thus, he proved that the sulphates were not necessary for the formation of the gas. He disagreed with Petri and Maassen on the cause for the hydrogen sulphide development. Rubner concluded that the formation of hydrogen sulphide is not a secondary reduction process, due to the formation of nascent hydrogen, contrary to the belief expressed by the other two authors. Stagnitta—Balistreri[3], on working with twenty-three various species of bacteria, found that forty per cent. of them gave hydrogen sulphide in peptone bouillon and plain bouillon. He tried to obtain some quantitative data by comparing the extent of the color on lead acetate paper to the color of the papers exposed to known quantities of hydrogen sulphide. Petri and Maassen found that the addition of sulphates and thiosulphates will also result in the development of hydrogen sulphide. With regard to the thiosulphates this has also been observed by Rosenheim and Gutzmann[4].

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[1] Congress internat. d'hydroth. et de climat. Biarritz 1886.

[2] Wratch 1887 No. 16.

[3] Wratch 1890 p. 717.

It has been stated that bacteria can not be classified as hydrogen sulphide formers and non-hydrogen sulphide formers, as was first supposed. On addition of 10 per cent. peptone bouillon to ten species, which had not reacted in bouillon containing less peptone, Petri and Maassen obtained a strong hydrogen sulphide reaction.

I undertook to incubate the species, employed during my work, previously mentioned, in media containing sulphur in various forms and found in a general way that the results coincided with the results of former observers. A medium of the same composition as medium "A" but containing sodium thiosulphate instead of sodium sulphate gave more or less hydrogen sulphide in each case on aërobic incubation at 37° C. In a few cases the quantities were so small as to be hardly perceptible on lead acetate paper. Sulphur added to sterile sewage formed hydrogen sulphide aërobically with all species except B. lactis aërogenes, Proteus Zenkeri, Proteus mirabilis, B. pyocyaneus, Staphyloc. pyogenes albus, B. anthracis, B. dysentery and B. subtilis. It is very likely that the number of positive tests would have been greater if more time had been allowed for incubation. Plain bouillon gave a decided reaction only with B. enteritidis, Proteus vulgaris and traces with B. mesentericus. The rest proved negative on aërobic incubation for over one week. Lactose bouillon gave a strong growth with B. enteritidis and Proteus vulgaris. A few species showed traces of hydrogen sulphide in bouillon containing 10 per cent. peptone (reaction +1). All cultures gave a hydrogen sulphide reaction sooner or later on aërobic as well as anaërobic incubation.

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[1] Arb. kais. Gesundh. 1893, vol. 8, p. 318.

[2] Arch. Hyg. vol. 16, p. 53.

[3] Arch. Hyg. vol. 16, p. 10.

[4] Fortschritte Med. 1887, No. 11.

On repeating the experiments with 10 per cent. peptone bouillon several times, it was interesting to note that the strong hydrogen sulphide formers gave a strong reaction throughout the entire series, while species giving weak reaction would on repetition always prove weak in the same length of time.

I am not inclined to attach very much significance to this quantitative difference in the behaviour of the bacteria towards the organic sulphur in peptone though it might prove valuable to classify the various species distinctly as to their hydrogen sulphide forming properties. This can be done, providing, certain standards are adopted for time of incubation, the uniform composition and reaction of medium, temperature of incubation, age of culture, etc. The virility of the culture is a factor of great importance. A rejuvenated culture will show hydrogen sulphide sooner than an old stock culture. Care was taken, therefore, to employ fresh cultures throughout the tests.

In order to gain some information on the hydrogen sulphide forming properties of crude sewages in such a peptone medium a few quantitative experiments were made, which are given in the following:

A 10 per cent. peptone bouillon was prepared and 1 c. c. of an approximate 10 per cent. sodium sulphate solution was added to each test tube to allow for a possible sulphate reduction. The quantity of medium in each test tube was exactly 15 c. c. A quantitative determination showed that the test tube contained 12.0 mg. of organic sulphur and 86.9 mg. of sodium sulphate anhydrous. Each test tube was provided with a tight fitting rubber stopper. The upper part of the thistle tube with a double bend fitted into the stopper and some absorbent cotton moistened with a saturated solution of basic lead acetate with 5 per cent. of glycerine was plugged into the funnel, so that all hydrogen sulphide formed would be bound chemically. One c. c. of crude sewage was added to the medium and the mixture incubated aërobically as well as anaërobically at 37° C. for exactly twenty-four hours. The test tube was then put into warm water to drive out any gaseous hydrogen sulphide in solution. The cotton plug and the incubated liquid were washed into an Erlenmeyer flask and the liquid acidified with sulphuric acid in order to release the hydrogen sulphide bound in the form of sulphides. The liquid was then distilled and the distillate received in a N/100 silver nitrate solution. The distillate was made up to 100 c. c. thoroughly shaken, filtered and 50 c. c. of the filtrate titrated with N/100 potassium sulpho-cyanate solution, using ammonio-ferric-sulphate solution as an indicator.

Two tubes containing the sterile medium were incubated and served as blank tests. There is always some hydrogen sulphide split off even from a 10 per cent. peptone solution on mere boiling. It is, therefore, absolutely necessary to run blank tests. The average of the blank tests showed that 15 c. c. of the sterile medium distilled with the acid under the same conditions as the inoculated cultures gave about 0.33 mg. of hydrogen sulphide. The sterile medium incubated for twenty-four hours and then distilled as before gave on an average 0.39 mg. of hydrogen sulphide or an excess of 0.06 mg. over the direct distillation. The figures remained the same for aërobic as well as anaërobic incubations. The hydrogen sulphide figures in the following table represent the gas with the blank subtracted. Very good checks have been obtained in each case for the blanks as well as for the inoculated media.

Sewage Ser. No.	Total suspended matter p. p. m. (sewage).	Oxygen consumed p. p. m. (sewage).	N as free ammonia p. p. m. (sewage).	N as organic nitrogen p. p. m. (sewage).	Relative stability (sewage).	H_2S developed aërobic mg. (medium).	H_2S developed anaërobic m. g. (medium).
1	296	60	5.6	6.9	29*	0.95	0.95
2	134	59	8.8	9.6	26*	1.04	1.08
3	88	24	6.4	8.8	53*	0.77	0.91
4	106	—	8.4	6.8	56*	0.67	0.90
5	90	28	8.8	8.0	64*	1.06	1.13
6	142	56	5.6	9.3	29†	1.01	1.05
7	106	58	8.4	8.1	29‡	0.94	0.91

* Dilution: 1 sewage to 3 lake water.

† Dilution: 1 sewage to 4 lake water.

‡ On incubation for twenty-four hours at 37° C. in 10% peptone bouillon containing sodium sulphate.

The results indicate that under anaërobic conditions, the quantity of hydrogen sulphide formed is somewhat larger, particularly in sewage No. 4. Apparently the other data obtained do not bear a distinct or definite relationship to the amount of hydrogen sulphide developed. This is to be expected since we know that the formation of hydrogen sulphide in sewages or in proper artificial organic solutions is a specific property of the bacterial cell body. The action is selective and depends apparently a great deal upon the position of the sulphur radicles in the protein molecule of which we know little. A bacillus may be a strong nitrate reducer and yet a very weak hydrogen sulphide former, although both processes are reduction processes.

The subject of putrid odors in sewages is a highly complicated one. I have spoken of one phase only, viz: the formation of hydrogen sulphide in its relation to inorganic or organic sulphur compounds, but we must also consider that other organic volatile sulphur compounds are likely to be formed, which from a practical working standpoint might prove troublesome.

The writer wishes to express his appreciation of the valuable continuous assistance of Mr. Frank Bachmann, assistant chemist of the Sanitary District, in the work necessary for the preparation of this paper.

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UNIFORM HEALTH REPORTS.

Health officers and others who have occasion to study and compare the annual reports of health departments find the task difficult, and not infrequently impossible. No definite scheme is followed in most instances and the reports do not give the information sought or if it is given it is apt to be so obscured as to be worthless. It is certain that health reports are undergoing a marked improvement, and it may be said that in general the improvement is for the better.

There is much information in the annual health records capable of uniform treatment. It must be recognized, to be sure, an annual report is presented primarily for the benefit and information of the officers of the city government and its citizens. Nevertheless, the out-of-town circulation is considerable and growing, and the up-to-date health officer is endeavoring to study the methods used, and the results obtained thereby, in other communities. There are many apparent reasons why uniformity in certain respects is to be desired.

More than two years ago, the Massachusetts Association of Boards of Health appointed a special committee on Uniform Health Reports. This committee presented its report at the last meeting of the association, and is printed in full elsewhere in this issue of the JOURNAL. It is believed that health officers throughout the country will find much in this report of interest and value and that it warrants a most careful perusal. The committee, while recommending a certain degree of uniformity, strongly warns against the danger of too great a uniformity and states that "if greater uniformity in reports should encourage the health officer in complacently following the routine practice of other communities, it would be better to allow the present confusion to continue."

The committee had a difficult and exacting problem but it has handled it in a very thorough and satisfying manner. We believe that this kind of work is of the greatest importance. It is not of application alone in Massachusetts. It should cause health officers everywhere to stop and take stock of their own reports and study them from the point of view of improvement and uniformity.

THE CONTROL OF CANCER

Still another scourge of man has called forth a movement to combat it. This latest recruit in the public health field is the American Society for the Control of Cancer. The new association is unique in that it is attacking a disease the cause of which is unknown and regarding which the ignorance is profound. Its specific task is the education of the public to the recognition of the significance of certain symptoms and the necessity for early diagnosis and operation. As in the case of many of its sister societies, the initiative has been taken by leading members of the medical profession in America who have called to their side interested laymen to insure the efficiency and success of the movement. It is understood that the pathology of cancer will not be regarded as falling within the field of the new society, but in addition to public education, careful studies will be made of the incidence and distribution of the disease as well as of the results of operative procedure. Ignorance of causation naturally renders the cancer problem more baffling than that of tuberculosis, or the other preventable diseases which the civilized world is now engaged in fighting. For that reason there is, perhaps, the greater need of initial steps and we welcome the new organization to the group whose activities give vigor to the great public health movement of the day.

PRACTICAL AND JUST LEGISLATION RELATING TO STREAM POLLUTION.

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To discuss intelligently the question of practical and just legislation relating to stream pollution, there is necessary a thorough knowledge of the nature of streams and the numerous uses made of them under present day conditions, as well as a clear understanding of the sources and results of pollution, and the means available for minimizing its effect on the streams, and, where necessary, bringing about its prevention.

Streams perform the double function of supplying water to riparian owners and draining the territory through which they flow. They are used for power development, for navigation, and for irrigation. Certain fish industries are dependent upon them, and in modern communities the streams are serving more and more as centers of health and recreation. The relative importance of the several uses made of streams varies with local conditions.

Even in nature river water is seldom "pure," and in populated areas it contains drainage of all sorts:—from undeveloped areas, from farm lands and fertilized fields, from country roads and from city streets. Mine drainage is discharged into the streams, as well as wastes of all kinds from manufacturing establishments, and finally, domestic sewage from individual houses, from shipping, and from communities, small and large. The water often becomes colored and turbid, and may have an objectionable odor if it contains large quantities of easily putrescible organic matter. Disease germs are sometimes present, and the insoluble matters carried in suspension often deposit on the bed and banks. It is thus evident that the question of pollution is one of *degree*, also, that distinction should be made between avoidable and *unavoidable* pollution. The degree of pollution *permissible* is largely determined by the *use* made of the stream, while the extent to which pollution becomes *noticeable* depends on the population contributing sewage and manufactory wastes, the natural character of the water and the volume available at all times for dilution, the frequency and magnitude of flood flows, and the character of the river channel with respect to alignment, grade and natural or artificial obstructions to the free flow of the water.

The present rapid growth and congestion of population, accompanied by the increased variety and volume of liquid wastes from industrial plants, has brought many of our rivers to a very serious condition, while the numerous uses now made of them render necessary *some* form of legislative control. The *necessity* for such control is increased by the lack of relation between political boundaries and natural drainage areas, by the inability or unwillingness on the part of individuals and communities to provide and maintain suitable works for the treatment of polluting matters, and to the fact that the parties responsible for the pollution of a stream are often those who would be the least benefited by keeping it clean.

To a considerable extent streams clean *themselves* through natural agencies:—such as sedimentation, aëration and consequent oxidation of easily putrescible organic matters, and the removal and disposal of sludge deposits by freshets and currents. *Artificial* means which may be employed for maintaining rivers in an unobjectionable condition include (1) their regulation, from a hydraulic standpoint and with a view to providing uniform flow, straight channels, good grades and smooth beds,—(2) the dredging of deposits,—and (3) the collection and treatment of polluting matters *previous* to their discharge into the streams. The efficiency of the *natural* agencies, as well as the applicability of the various *artificial* means of bringing about the desired results, depends in each case upon local conditions; the degree of cleanliness actually *practicable* being controlled largely by cost. River cleaning must also be considered in its proper relation to *other* branches of municipal activities.

There are some streams located *entirely* within the political boundaries of individual states, and others whose drainage areas extend into two or *more* states. A *few* of our streams also constitute international boundaries, and there is a further distinction between tidal or navigable waters, and the *un*navigable portions of streams. The national government, through the War Department, very properly exercises a certain control over tidal and navigable waters. The states, in some instances acting through their boards of health or specially appointed commissions, attempt to prevent the serious pollution of streams within their boundaries. River control and regulation has also been undertaken in some metropolitan districts as well as in individual municipalities, and in many instances much of good has been accomplished. But on account of the fact that the supervising officials often have very little *real* power, and because their supervision seldom extends over *entire* drainage areas, the results are not all that could be desired.

It is therefore important that steps be taken to provide suitable legislation looking to the maintaining of our streams in a reasonably clean condition, and as there would be many advantages in having such legislation more or less uniform throughout the country it might be made subject to the approval of some national governmental agency.

It is *not* desirable to have laws prescribing the exact degree of cleanliness to be maintained, because the proper degree will differ for each set of conditions, and because the cleanliness of the water is only one phase of the general problem.

Legislation *should* provide for boards of control having power to determine, in each individual case, the limits of permissible pollution. It should also define the methods of appointment, or election, of such boards, their membership, powers, and duties, and their relation to existing governmental agencies, as well as determine how money shall be raised for carrying on their work.

The boards of control may be advisory and supervisory with police authority like many of the existing state boards of health, the actual construction and operation of works being left to individuals and municipalities, or they may have complete power to raise money and to build and maintain works of all kinds, like the Sanitary District of Chicago and the Emscher Federation of Germany. The relative advantages and applicability of the two types will vary with local conditions.

The Emscher Federation is, in many respects, the most interesting river board now in existence, and as six years of operation have proved that it is founded on correct principles, the author presents a translation of the statute under which the Federation works, as well as a description of the conditions in the drainage area of the Emscher River and an account of the work accomplished.

THE EMSCHER FEDERATION.

Conditions in the Emscher District previous to the Formation of the Federation.

The drainage area of the Emscher River is located in the heart of the coal and iron industrial district of western Germany. It covers an area of 308 square miles and has a population of about 2,000,000. Essen, the largest city in the district, now has nearly 300,000 inhabitants, an increase of more than 100 per cent. during the past ten years; while ten of the other municipalities have a population of more than 50,000 each. The average density of population for the entire drainage area is approximately 6,500 per square mile.

Some of the coal lands are still undeveloped, but they are being opened up year by year, so that the present rapid increase in population is likely to continue, and the conditions, from a sanitary standpoint, would naturally become worse rather than better.

The main stream has its source in the vicinity of Dortmund, and flows in a general westerly direction for a distance of 68 miles to the Rhine which it joins at a point 50 miles below Cologne and 125 miles above Rotterdam. The total fall in the course of the Emscher is nearly 400 feet; but there are long stretches where the bed of the river has practically no slope and the velocity of flow is slight. Some of the land in the district is under cultivation. The soil is rather impervious, however, and wooded areas are not extensive, so that there would naturally be a small flow in the streams during dry weather. Practically no ponds or storage reservoirs are to be found within the watershed. On the other hand, the rainfall (approximately 30 inches annually) is distributed uniformly throughout the year, and the normal yield of the watershed is increased by the sewage of some cities which obtain their water from other drainage areas. Water is also discharged into the river from coal mines, of which a number are located close to the limits of the district, being pumped out of the ground from depths varying from 500 to 2,500 feet.

The coal-mine drainage constitutes under present conditions a little less than one third of the total flow of the stream, while the sewage from the various municipalities forms an equally large proportion of the river. The average quantity of water flowing in the Emscher at its mouth is approximately 318 cubic feet per second, or 667,000 gallons per square mile of watershed per day. The minimum average flow during any one month is ordinarily not less than 191 cubic feet per second, as compared with a minimum flow in the Rhine, where it receives the discharge of the Emscher, of 30,420 cubic feet per second (from 59,500 square miles).

Ten years ago when the sanitary conditions in the Emscher district began to be seriously considered, only a small part of the population was provided with adequate sewerage facilities. Two of the cities had complete systems of sewers, one, the combined system, with disposal of the sewage by broad irrigation outside of the drainage area, the other, a storm-water system only, which however, received much pollution from house cesspools, with disposal by chemical precipation and ultimate discharge into a tributary of the river. In those municipalities not provided with sewers the brooks were seriously polluted by sewage and trade waste of all kinds.

The coal-mine drainage carried in suspension large amounts of fine coal dust, which settled out where the current in the river was slight. At some of the mines this drainage was passed through settling tanks before being discharged into the river, but as a rule the tanks were so poorly designed and operated that they were not effective in keeping the coal sludge out of the stream. Iron works and factories of all sorts contributed in similar ways to the pollution of the water.

Another important factor in the situation was the gradual sinking of the ground in many sections above the coal mines. Such settling along the course of the stream led to the formation of extensive shallow basins, which gradually became filled with coal sludge and other refuse, thus bringing about extremely unsanitary conditions.

The odors rising from the brooks and flooded areas were very objectionable, while much of the land was unsightly and so poorly drained that it could not be used for agricultural purposes and had become a breeding place for mosquitoes. Fortunately there is seldom continued hot weather or drought in this section of Germany so that the nuisances were not as bad as they might have been.

Conditions were steadily becoming worse, however, and with the rapid increase in population, it became imperative to take steps to abate the nuisances then existing and to provide proper sewerage and drainage for the entire district.

How the Emscher Federation was Brought About.

The Prussian Government had already ordered the cities and large towns in the valley to provide proper sewerage, without stating definitely what disposition was to be made of the sewage. In 1902 a number of the municipalities and industrial corporations, most affected by the condition of the river, joined forces to form an association for making a thorough investigation and outlining a plan of action. During the following two years all phases of the general problem were carefully studied by experts. The report of the chief engineer, Königlicher Wasserbauinspektor Middeldorf, was presented to the association on January 1, 1904. It contained, in addition to a description of the existing conditions, a comprehensive plan for the construction of sewers, purification plants and improved channels for the river and its tributaries; together with the draft of a bill to be presented to the Prussian Government for creating a permanent Federation and board of control to have charge of the undertaking.

The work to be done by the Federation, as indicated by the investigations, may be briefly outlined as follows:—

1. To compel the cities and towns to provide and maintain proper drainage and suitable sewerage systems, for house sewage, for liquid wastes from manufacturing establishments and for surface water; to compel the discharge of manufacturing wastes, after preliminary treatment where necessary, into the sewers instead of the streams: to abolish cesspools, not only as a

means of preventing local nuisance but for the purpose of keeping the sewage as fresh as possible.

2. To design, to construct, and later on to maintain and operate main sewers common to two or more municipalities, as well as all necessary pumping stations and disposal works for treating the sewage. The term "disposal works" may here be considered to include clarification plants for the treatment of coal-mine drainage.

3. The largest and perhaps most important part of the work consisted in regulating the main stream so that the entire valley would be well drained at all times. This involved relocating the river throughout much of its course, relining, enlarging and deepening the channel of the river and many of its tributaries, and draining flooded or swampy land. From the start it was evident that it would not be feasible to provide complete biological treatment for all sewage and manufacturing wastes. It thus became essential for the streams to have good grades as well as smooth and regular channels in order that there might be no opportunity for accumulations of objectionable deposits.

The total cost of the undertaking was originally estimated to be in the vicinity of $15,000,000; two thirds of which would be spent for the improvement of conditions along the course of the river, the remainder being for the construction of main sewers and disposal works. This was a task requiring not only the best engineering skill for its execution but power to raise and spend money and to exercise a very complete control over conditions in a large district.

The Statute: A Translation and Explanation.*

MEMBERSHIP.

The law creating the Emscher Federation was enacted by the Prussian Government, on July 14, 1904, and supplemented by a Statute on March 19, 1906. The Statute provides that the Members of the Federation shall be all existing municipalities, both urban and rural, and totaling more than 100, which drain partly or wholly into the Emscher River or its tributaries. Municipalities within the drainage area, created subsequent to the passage of the law, shall also be members of the Federation. The magnitude of the work to be undertaken as well as the serious character of the existing conditions rendered it desirable that the Federation should be compulsory upon those municipalities who showed no interest in joining.

In addition to the "Members" of the Federation, reference is made in the Statute to so-called "Interested Parties" such as the Mines, the Railroads, and other industrial Plants and Factories located in the several municipalities. The Interested Parties are represented indirectly in the Federation and bear part of the expense of building and maintaining the federation works.

It might be mentioned here that the state of Prussia is divided into Provinces each of which contains a number of Districts within which are located the urban and rural Municipalities. The Emscher district is located in the Rhine province and the province of Westfalia.

PURPOSE AND POWERS.

The purpose of the Federation, as explained in the Statute, is to provide for the regulation of the streams in the drainage area of the Emscher river and for the treatment of the sewage, as well as for the maintenance and operation of the completed works. That the Federation shall maintain and operate the completed works is particularly desirable, since settling of the ground above the mines results in the necessity for frequent repairs and alterations. The various works are in general based on a preliminary design prepared by Middeldorf in 1903, but the original scheme has been altered or extended, with the approval of the proper government officials, as found desirable.

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*Made by the author and Richard H. Gould, Asst. Eng. with the Emscher Federation, Essen, Germany.

The Federation has the power to take charge of treating the sewage and trade waste of the mines and industrial establishments, as well as that of the municipalities. In numerous cases, however, it has been found desirable to leave it in charge of the individual party. At many of the coal mines, for example, the owners are interested in reclaiming and using the coal dust in the waste water. If the treatment of trade waste, however, is not carried out in a satisfactory manner, the Federation may assume full control, and assess on the owners the cost of building and operating suitable works. All works, whether built and maintained by the Federation or by individuals, are operated under regulations made by the Federation.

In many respects the Federation possesses the same rights as a municipality. It has full control over all water courses in the drainage area and can make such alterations, both in location and elevation of the channels of the streams, as prove desirable, irrespective of highways, railways, or canals. It may assume financial obligations and exercise the right of eminent domain, taking and holding what land is necessary for carrying out its works. If a satisfactory agreement as to price cannot be made with the owners, the matter is referred to the courts.

The working bodies of the Federation are the Federation Assembly, the Executive Committee and the Protest Commission.

Relation to Existing State Officials.

The Federation comes under the supervision of the State, which is comparable with our national government, the supervising official being termed "Supervisor." The Supervisor must be a "President" of a Province, and he is appointed by the head ("Minister") of one of the state departments.

There is a state department of Agriculture, Public Works, Industry and Commerce, Interior (including a Board of Health) and Education. Particularly unsanitary conditions at any point in the state are investigated by a special commission of representatives from each of these departments.

The Supervisor's powers are limited to seeing that all federation matters are handled in compliance with the Statute. His definite approval is required for the making of loans which permanently increase the federation debt, and for regulations relative to the "Apportionment of Federation Expenses," and to the use and maintenance of the federation works. He calls together the first Federation Assembly after preparing a temporary "Apportionment of Expenses" as a basis for representation of the Members, and he may, when he sees fit, call special meetings of the Assembly. If valid elections of members of the Executive Committee and Protest Commission are not held when they should be, the Supervisor makes the necessary appointments, and if the Federation fails to meet its financial obligations, he may raise the necessary money and pay the bills. Against such action on his part the Federation may appeal to the superior courts of the State.

Presidents of the Provinces, and the Districts may attend meetings of the Federation Assembly and the Executive Committee and give advice, and the State Bureau of Mines has the same privilege. The Statute provides that they shall be notified of all meetings and furnished with information relative to the subjects to be discussed at the meetings.

All general and detail construction plans of federation works must be approved by the local municipal building officials, by the officials of the District, and by the proper state departments, but the law says nothing about the methods to be adopted for either river regulation or sewage purification.

Federation Assembly.

The Federation Assembly consists of Representatives elected every six years by the legislative bodies of the federation Members, the number of Representatives depending in each case upon the amount contributed by the Members towards the federation expenses. The elections are arranged in such a way that the newly elected Representatives form only a small proportion of the total number in the Assembly. All the Representatives have substitutes. Each Member sends at least one Representative. When the annual contribution of a Member exceeds $3,750, the Member may send a second Representative, and for each additional annual contribution of $3,750, a further Representative. If a Member sends two Representatives to the Federation Assembly, one of them must be connected with the mines. Furthermore, if a municipality which sends 10 Representatives, receives 50 per cent. of its taxes from the mines, then 5 of the Representatives must be connected with the mines.

Disputes as to the validity of the election of Representatives are decided by the Supervisor, with right of appeal to the proper (state) Minister. If a federation Member fails to elect its Representatives, they are appointed by the proper state officials. Representatives have the privilege of voting by written proxy when they are unable to attend the meetings of the Assembly. They lose their right to vote if they change their residence to a point outside of the Emscher drainage area.

According to the law it is compulsory on the Federation Assembly to meet at least once during the period for which the Apportionment of Expenses is made. Special meetings may be called by the Supervisor or by the Executive Committee, and must be called at the request of one quarter of the Representatives. The principal duties and powers of the Assembly are as follows:

Elect the members of the Executive Committee and the Protest Commission.

Approve the general principles governing the appointment and service of employees.

Assume the power to borrow money.

Determine rules and regulations relative to use and maintenance of the federation works.

Decide on the length of the period for which the Apportionment of Expenses is to be made.

Approve the Budget prepared by the Executive Committee.

Determine the proper expense accounts for members of the Executive Committee.

Decide as to alterations and extensions of the general plan of the federation works.

Change, when desirable, the Federation Statute, subject to the approval of the proper (state) Minister.

Arrange for dissolution of the Federation, should this become desirable. Dissolution calls for a two-thirds majority of the Representatives and the approval of the King of Prussia.

The Assembly must keep written records of its proceedings. The meetings are public, but the "publicity" may be waived when desired.

EXECUTIVE COMMITTEE.

The Executive Committee is the legal representative of the Federation and attends to all federation business which is not expressly referred, by the Statute, to the Federation Assembly. It is composed of 10 members, one of which is the chief engineer of the Federation. The other nine members are elected by the Assembly to hold office for six years. One-third of the elected members retire every two years, but are eligible for reëlection. The Statute states that three members of the Committee must belong through residence to the Rhine Province, and four to the Province of Westfalia. At the same time, the Mines, the other Industrial Plants (including the Railroads), the Agricultural Interests, and the Municipalities (taken as a whole) each have at least one Representative on the Committee.

A sanitary expert, employed by the Committee, is present at the meetings, which are called at the pleasure of the chairman, or upon request of three of the members. The committee meets on an average of about once each month, six members constituting a quorum. Disputes relative to the validity of the election of members of the Committee are decided by the state Supervisor with right of appeal to the proper Minister. Written records must be kept of the proceeds of all meetings.

The Executive Committee appoints the chief engineer and other federation employees and prepares regulations governing the appointment and conditions of service of the employees. It may also appoint special commissions for special work.

Its chief functions, however, are the preparation of the annual Budget, keeping the accounts, and apportioning, among the Federation Members and Interested Parties, the expenses connected with the construction and maintenance of the federation works. It is expressly stated in the Statute that the first annual Budget shall provide, principally, for the regulation of the main river, and the Committee is given the power to determine at what time money shall be raised for regulating the tributary streams and providing Sewage Disposal Works. If protests are raised within four weeks to the Apportionment of Expenses, they are taken under consideration by the Committee, which may then alter the original apportionment. The changes thus made, with the reasons therefore, are sent to the Parties who have made the protests.

Apportionment of Expenses.

The expenses connected with building and maintaining the federation works are met by assessments levied on the Members of the Federation and the so-called Interested Parties. The first Apportionment of Expenses, as already mentioned, is made by the Supervisor as a basis for the representation of Members in the Federation Assembly. Subsequently it is made by the Executive Committee. The Statute states that the expenses shall be apportioned annually during the first five years, and after that, at least once in six years.

It mentions further, that the annual Budget shall include allowance for maintenance and operation of the federation works, interest charges and sinking fund payments on loans, and regular contributions to the Reconstruction and Reserve Fund which is provided to cover the cost of repairing federation works that have been damaged, by sinking of the ground, by floods, etc. The Reconstruction and Reserve Fund is gradually increased until it equals, at least, the amount of the annual Budget, averaged for the three preceding years. The Fund must be held in reliable securities, and when drawn upon, the amount used, as well as the purpose therefore, must be reported by the Executive Committee to the Federation Assembly at its next meeting.

The Statute stipulates that in drawing up the Budget, the cost of the works for the main river and for the tributaries shall be kept entirely separate, and that in apportioning the federation expenses, consideration shall be given, first to the *Responsibility*, of those assessed, for the existing objectionable conditions, and second, to the *Benefits* which will result to them, directly or indirectly through the construction, and operation of the federation works. If the free outlet for the water in any locality is interferred with by settling of the ground resulting from the operation of a coal mine, the owners of the mine must pay for the necessary alterations in the channel of the stream. And should a town persist in allowing septic sewage from cesspools to enter the sewers, it will have to pay a larger yearly assessment as its share of the expense of operating the sewage disposal works.

Industrial plants, other than the mines, are not assessed directly unless the amount they would have to pay is greater than $1,250 per year. In cases where the annual assessment would be less than this amount, it is made a part of the assessment of the municipality in which the plant is located. New industrial plants, or extensions of existing plants which would increase their assessment by more than one fourth, are provided for in amendments to the Apportionment of Expenses prepared every three months. At the end of the first five years the Federation Assembly may determine whether it will be desirable or feasible in the future, to regulate the assessments by a Statute. Such a Statute or regulations would require the approval of the Supervisor.

The annual assessments of the federation Members must be deposited at headquarters every three months. If not paid, the amount, without interest, is added to the next annual assessment. The annual assessments of the Mines and other Interested Parties must be collected quarterly by the federation Members and turned over to the Federation. The Statute defines such assessments as ordinary public debts which may be collected by the regular process of law. The foregoing applies to temporary occupants, as well as to the owners, of industrial plants.

The Apportionment of Expenses, when drawn up by the Executive Committee, must be made public and sent to all those concerned in it. After it has been revised, on account of objections which may have been raised, it is published a second time and then submitted to the Supervisor for his approval, the approval being limited to the form of the document and its compliance with the law. Further protest against the Apportionment of Expenses may be made to the Protest Commission, but such protest does not excuse from payment of the assessment.

The annual operation and maintenance charges for the regulation of the main river, with interest figured at 4 to $4\frac{1}{2}$ per cent., are about $7\frac{1}{2}$ per cent. of the capital invested. For the sewage disposal works they have been found to be about 10 per cent. Approximately one per cent. of the total federation debt is paid off each year.

PROTEST COMMISSION.

The Chairman of this Commission is a state official, usually a judge from the courts, who is appointed by the Supervisor and may not belong, through residence, land ownership, or business interests, to any of the municipalities in the Emscher drainage area. Another member of the Commission is an official from the State Bureau of Mines, appointed by the Bureau.

This is a very desirable arrangement, as the mines bear nearly 60 per cent. of the total expense of building and maintaining the federation works. Furthermore, the mines are often the largest taxpayers in a municipality, and thus contribute indirectly a large part of the municipality's assessment.

The Commission includes one of the Drainage Commissioners of the state department of unnavigable streams, likewise appointed by the Supervisor, and six of the Federation Representatives elected by the assembly for periods of six years. They may not be members of the Executive Committee. Two must be from the municipal delegations, and two professionally from the mining interests, and one professionally from the agricultural interests. At the same time, two must be from the Rhine Province and two from the Province of Westfalia. Any of the elected members of the Protest Commission may, for cause, be removed from office by the Supervisor, but with right of appeal to the proper Minister. Seven of the nine members of the Commission constitute a quorum. The meetings are public and are held at the federation headquarters or, when desirable, at any other place in the district. The members are reimbursed for travelling expenses and receive compensation, determined by the Executive Committee, for special work. In straightening out the protests, the Protest Commission has the power to make use of the federation employees. The expenses connected with this work are borne by the Federation but in special cases they may be assessed on the parties making the protests. There is no appeal from the final decisions of the Commission.

Work Accomplished.

A fundamental question in planning sewerage for the District was the kind of treatment to give the sewage. Ultimate discharge into the streams being unavoidable, it was evidently necessary, in view of the small stream-flow, to give the sewage *some* form of treatment.

After a careful study of the several processes of sewage treatment then in use, and much experimental work on a practical scale, it was decided to make provision for removing from the sewage as large a part of the suspended matters as possible, but *not* to go to the expense of providing works to oxidize the dissolved organic matter except in cases where the effluent was to be discharged into small, sluggish and poorly regulated streams. This decision was to some extent based on a belief that organic matter held in solution in sewage will not putrefy so long as the sewage is exposed to the air and flows rapidly in smooth channels. All of the Sewage Disposal Works in the Emscher district, with one exception, consist of Settling Tanks of the Imhoff type and Sludge Drying Beds.

Because of the occasional gradual sinking of the ground which takes place in many parts of the district it was evident that both closed sewers and open channels would be insecure and would have to be especially protected. Furthermore, the settling of the land surface being unequal, the grades of the sewers were likely to be subject to frequent disturbance. If it is desired to permanently maintain good drainage in such a mining district, the sewer mains as well as the stream beds must be made capable of deepening, and this requirement is better met by open channels than by closed sewers. Open channels under the conditions in the Emscher district are also the cheapest to build.

It was therefore decided to use open channels for the main sewers leading to the sewage disposal works as well as for the smaller streams receiving the effluents of these works. The invert and side slopes of the channels are of smooth concrete blocks, which tend to prevent growths of vegetable organisms on the sides of the channels, and the grades adopted are sufficient to give a rapid current, the minimum allowable mean average velocity of the water being figured at 2.3 feet per second.

Good grades and smooth open channels which allow of the purifying action of sunlight and air have been found effective in keeping sewage fresh, and the character of the settled sewage gets better and better the further it goes. In some instances the raw sewage has a septic odor at the point where it enters the main sewer, due to the presence of cesspool cleanings, but this odor is much less noticeable when the sewage reaches the disposal works, perhaps a mile away. The open sewers are properly fenced on both sides, and there are inspectors who care for each section of the system and remove obstructions.

At various points along the line of the main river, as well as on the principal tributaries, sudden changes in grade, with a drop of 3 to 10 feet have been provided so that it will be possible to lower the beds of the streams at any point in the district whenever rendered necessary by subsidence of the ground.

After six years of active construction work there has been a material betterment of conditions all over the valley, and sewerage and suitable drainage facilities have been provided in most of the cities and towns. As a result of the continued rapid growth in population there is, however, much of this work still to be done and in some places it has not yet been possible to abolish all the cesspools or prevent their contents being occasionally discharged into the sewers.

The construction of main sewers and improved channels for the streams has done much towards reclaiming for building purposes or agriculture large tracts of land formerly under water, or so wet during much of the time that they were useless, unsightly and unhealthy.

There are already 20 sewage disposal works in operation in the district treating the sewage and manufacturing wastes of a population of approximately 700,000, and it is estimated that before December 31, 1913, 11 more works will be completed and treating the sewage of an additional population of 435,000.

The total estimated cost of regulating the main river is approximately $8,000,000, one quarter of which is for property rights. Seventy-five per cent. of this $8,000,000 has already been expended. At the present time the holdings of the Federation amount to 1,376 acres, nearly one-half of which is available for renting or selling, with an estimated value of $600,000. Three million dollars have been spent for the regulation of tributary streams and the construction of main sewers, and it is estimated that to complete this work there will be an additional expenditure of $8,000,000. The total length of main sewers already built and tributary streams that have been regulated is approximately 40 miles. The estimated cost of the sewage disposal works for the entire district is $1,750,000 which brings the total estimated expenditure for all the work eventually to be done by the Federation to $20,750,000, which is somewhat greater than the original estimate of $15,000,000.

During the year 1910–1911, the annual Budget was a little less than $500,000. When all the federation works are finished it will probably be at least double this amount. The largest individual assessment which has thus far been made was about $40,000 per year and was borne by the city of Essen, having a population at that time of 280,000. Some of the largest mining companies in the District have been assessed as much as $20,000 each per year.

Taking the district as a whole, the municipalities bear about 28.5 per cent. of the total cost of the works, the mines 54.0 per cent., the steel plants 4.6 per cent., other industrial plants 0.7 per cent., private water works 8.0 per cent., the railroads 3.5 per cent. and other interested parties 0.7 per cent. respectively.

After all the federation works are completed the total annual assessment on the municipalities, to cover all operating, maintenance and interest charges, will average about $0.27 per capita which is approximately one tenth of the regular annual state tax. The corresponding annual assessment on the mines will be less than $0.01 per ton of coal, the price of which now averages $3.00 per ton.

Success of the General Scheme and Reasons Therefor.

The most instructive thing about the Emscher Federation lies in its powers and organization, as already described.

The Federation was made possible, in the first place, by the seriousness of the conditions in the District and by the Unity of interest in these conditions, among a large portion of the population. The success of the general scheme is due in large part to the fact that the Federation has absolute control over all the conditions affecting sewerage and drainage in the entire watershed of the river, and particularly to the fact that it is *not* a supervisory board with police powers, but actually raises the necessary funds and does all the work.

Six years experience in carrying out the provisions of the Statute have indicated the correctness of the principles on which it is based, as applied to the conditions in the Emscher district. The fact that both the Executive Committee which apportions the expenses and the Protest Commission which decides on the justice of the apportionment, are made up largely of Representatives of the Federation Members which pay the expenses, presents certain difficulties, but thus far this phase of the working of the Statute has not caused any serious trouble.

Through its corps of specially trained engineers, numbering more than 150 men, the Federation not only designs the main sewers, the disposal works and the regulated streams for all parts of the District, and carefully supervises their construction; but also takes charge of their operation and maintenance. The working of the various sewage disposal works is also watched by competent engineers and chemists, the degree of purification effected, as well as the condition of the water in the streams, being determined by regular analyses made in laboratories maintained especially for this purpose, and a well equipped experiment station is constantly in operation.

Finally, the experience gained from the design and operation of the portions of the federation works first constructed has made it possible to improve on the design of subsequent portions of the works with a corresponding increase in their general efficiency.

At the present time the chief engineer, or Baudirektor, so-called, of the Emscher Federation is Herr Baumeister Helbing. The chief of the sewer department of the Federation is Dr.-Ing. Karl Imhoff to whom the author is indebted for much of the information in the foregoing article.

APPROVED TECHNIQUE OF THE RIDEAL-WALKER TEST.

SAMUEL RIDEAL, AND J. T. AINSLIE WALKER,

The following details of the Rideal-Walker Test have been collated from the literature of the subject, published during the past ten years, and may be taken to represent the method as officially adopted at the present time in Great Britain and the British Colonies. In this, as in all other arbitrary tests, the need for strict observance of the conditions laid down by the authors cannot be too strongly emphasized. It has always been found when discrepancies in results obtained by the Rideal-Walker method were investigated, that one or more of the conditions called for in the test had been ignored. In the case of the Lancet Commission, for instance, the explanation was found to lie in the fact that the commissioners had been working with broth prepared from bullock's heart instead of Liebig broth, which had the effect of depressing all coefficients by about 50 per cent.

It is hoped, in presenting the following details of this test in a form which admits of easy reference, that the difficulties hitherto experienced by workers in this country in controlling the manufacture and sale of disinfectants may be met and overcome.

MATERIALS REQUIRED FOR TEST.

Nutrient Broth.

Liebig's Extract of Meat	20 grams
Peptone (Witte's)	20 "
Salt (Sodium Chloride, C. P.)	10 "
Distilled Water	1 litre

Boil the mixture for thirty minutes, then filter, and neutralize with normal sodium hydrate solution, using phenol-phthalein as indicator. In order to avoid contaminating the broth with phenol-phthalein it is advisable to take an aliquot part of the filtered broth—say 10 c. c.—and titrate this with decinormal sodium hydrate, calculating the amount of normal sodium hydrate necessary for the neutralization of the remainder of the broth. Add when quite neutral 15 c. c. of normal hydrochloric acid. This will give the broth a reaction of + 1.5 per cent. The broth is then made up to the litre, filtered and sterilized. Where two or three litres are prepared at one time, as is customary, the broth is distributed in 500 c. c. flasks on the following day and again sterilized. Five c. c. are then run with the aid of a small separating funnel into sterile test tubes, which, after plugging with sterile cotton wool are placed in the steam sterilizer for half an hour or so.

Standard Carbolic Acid.

As carbolic acid crystals are very often contaminated by cresols to such an extent as to make them unreliable for purposes of bactericidal control, their purity should be established by a determination of the solidifying point (point of constant temperature) on at least 50 c. c. of the material with the thermometer in the liquid. The point is very sharp, the thermometer showing a constant temperature for a period of from five to ten minutes. The solidifying point of the crystals is 40.5 but anything over 40.0 may be accepted. A 5 per cent. (by weight) stock solution is then prepared and standardized by titration with decinormal bromine. From this solution (which keeps indefinitely in stoppered bottles) the various working strengths are made up by diluting some comparatively large quantity, such as 100 c. c., to the desired volume; this serves to eliminate the error introduced by measuring out small quantities of strong acid.

Dilutions of the Disinfectant.

A stock solution or emulsion should be prepared in 100 c. c. stoppered cylinder, with sterilized distilled water—10 per cent. if the coefficient be under 1, and 1 per cent. if over 1. Ten c. c. of this stock solution are used in preparing each of the 4 dilutions required for the test. Thus, working with a sample having a coefficient under 1, if it is desired to prepare a dilution of 1: 70, 10 c. c. of the 10 per cent. stock solution are diluted with 60 c. c. of distilled water, and in the case of a preparation having a coefficient over 1, where the dilution required is 1: 700, 10 c. c. of the 1 per cent. stock solution should be diluted with 60 c. c. of water. In preparing dilutions of the unknown, the limitations of the test must not be overlooked. The following is a safe rule for general work, expressing the dilutions as multiples of the carbolic acid dilution:—

With coefficients of 1 and under	x 0.1
With coefficients above 1 but not exceeding 10	x 0.5
With coefficients above 10 but not exceeding 20	x 1.0

For example, assuming that the strength of the carbolic acid control be 1: 100, when it is desired to test a sample having a coefficient of 10, the dilutions to be recommended would be 1: 950, 1: 1000, 1: 1050, 1: 1100.

The Broth Culture.

B. typhosus, grown in R. W. broth and incubated for 24 hours at 37° C. provides the test culture. To insure even distribution of the bacilli in the broth culture, and to avoid the necessity of filtration, the culture tube should be shaken and allowed to rest for half an hour before it is finally removed from the incubator, the temperature of which should not vary more than half a degree from day to day. It is advisable to make a sub-culture every 24 hours from the previous 24-hour culture, even if on many days no test is to be performed; but as this tends to attenuate the organism it should be continued for not more than one month, after which a fresh sub-culture in broth should be taken from a month-old agar culture. By this means a culture not varying much from day to day in resistance to disinfectants is obtained, making the selection of the proper dilution of carbolic acid much easier than it would be if the culture from which the 24-hour growth is obtained were older on one occasion than on another.

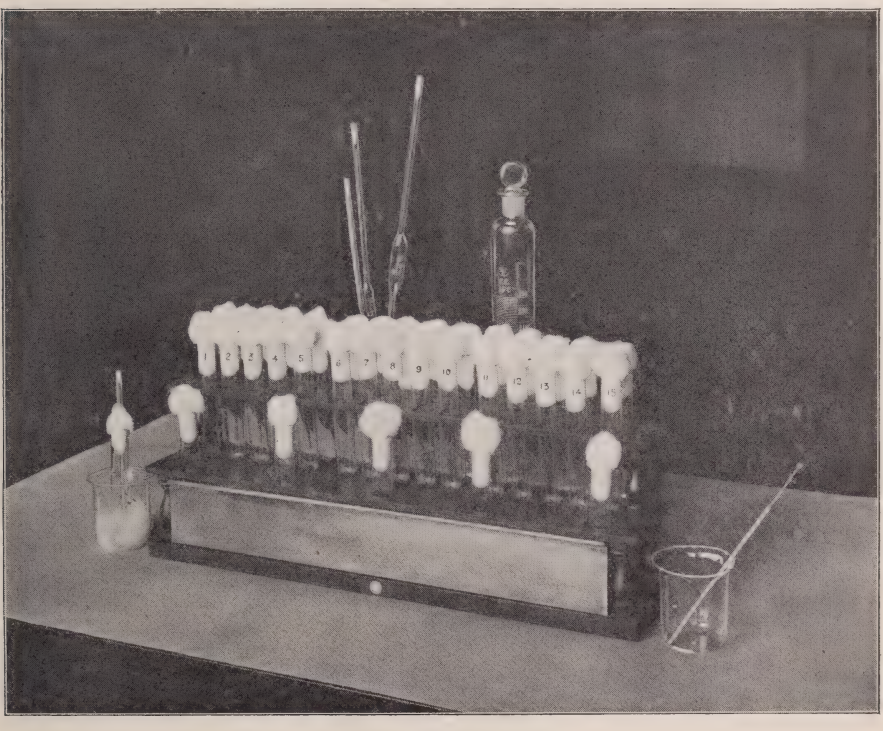

Fig. 1.

Apparatus Required for Test.

(The R-W apparatus as shown in Fig. 1 may be obtained from Arthur H. Thomas Company, of Philadelphia, Pa.)

Test Tube Rack.

A special rack is used. It contains two tiers, the upper having holes for 30 test tubes, in two rows, each row containing three sets of five; this tier is for the sterilized broth tubes, each of which is numbered with grease pencil. The lower tier is for the medication tubes—four with disinfectant dilutions and one with the carbolic acid control dilution, the latter being placed in the fifth hole. The lower tier is provided with a copper water bath to keep the temperature of medication within the prescribed limit—15° to 18° C. The test tubes being numbered in rotation it will be seen that the first medication tube is used for inoculating broth tubes, 1, 6, 11, 16, 21 and 26, the second for 2, 7, 12, 17, 22 and 27, etc.

Inoculating Needle.

The needle used should be composed of thin aluminium rod, with a short piece of platinum wire (26 U. S. gauge) passed through and twisted round an eye in the end of the rod, or otherwise firmly fixed thereto. The wire is made into a loop at the end and bent slightly in the center to allow of a fair sized drop being taken up for each inoculation. Satisfactory results cannot be expected when one tube is inoculated with a full drop and a mere film is introduced into another. The length of the wire to end of loop should be about 1¾ inches. After a little practice it is easy to obtain a satisfactory drop by dipping the needle in the medicated culture and bringing it out with a slight jerk. The loop used has an internal diameter of 3 m. m.

Test Tubes.

The test tubes should be of fairly strong glass so as to minimize as far as possible the risk of breakage, and lipped, to facilitate manipulation of plugs. Five inches by ⅝ inch is the size recommended for use. The cotton wool plugs for both medication tubes and broth tubes should be well made, so that they can be withdrawn and replaced without loss of time. A convenient method is to place a thin flat piece of cotton wool over the mouth of the test tube, with a smaller piece in the center to form a core, and to push both into position with the aid of a thin glass rod.

Dropping Pipette.

This is used for the broth culture and is standardized to deliver 0.1 c. c. per drop. It is loosely plugged at the top with cotton wool, and when not in actual use is kept in a sterile test tube plugged at the mouth with cotton wool. For greater convenience the tube should be passed through the center of the plug and fastened thereto with wire.

In addition to the above, one or two each of the following are required: 1, 5 and 10 c. c. pipettes; 100 and 250 c. c. stoppered cylinders (with inverted breakers, to safeguard against dust after removal from sterilizer); wire baskets to receive tubes for incubation or sterilization. All pipettes and cylinders should be standardized.

TECHNIQUE.

Before commencing the test it is necessary to ascertain the carbolic acid control dilution which will give the desired result — *i. e.*, life in 2½ and 5 minutes. This is done by running a trial test with 5 dilutions of the carbolic acid only—say, 1: 80, 1: 90, 1: 100, 1: 110 and 1: 120. Five c. c. of the control solution so ascertained are then pipetted into the fifth medication tube, the other 4 receiving 5 c. c. of the various dilutions of the disinfectant under test. To save time and apparatus, one pipette can be made to do service at this stage by starting with the phenol solution and following on with the highest or lowest dilution of the disinfectant, according as the coefficient is below or above one, rinsing out the pipette in each case with the next dilution before measuring off the sample for test.

The plug of the culture tube is now replaced by the culture pipette which, as explained above, has a plug attached to it with wire, at such a height that when the plug fits easily into the mouth of the culture tube, the point of the pipette is half way down the broth, and clear of the clumps. The first of the five medication tubes is now inoculated with five drops of the culture—*i. e.*, 0.5 c. c. At intervals of half a minute each of the other medication tubes is inoculated in turn. By the time the fifth tube has been inoculated the organism in the first will have been exposed to the action of the disinfectant for two minutes, and after the next half minute a loopful of the latter is inoculated into the first broth tube, loopfuls from the other medication tubes being in turn inoculated into their respective broth tubes at the rate of one every thirty seconds, By the time the fifth broth tube has been inoculated from the fifth medication tube, the disinfectant in the first medication tube will have acted on the test organism for 4½ minutes, and after the next thirty seconds a loopful is introduced

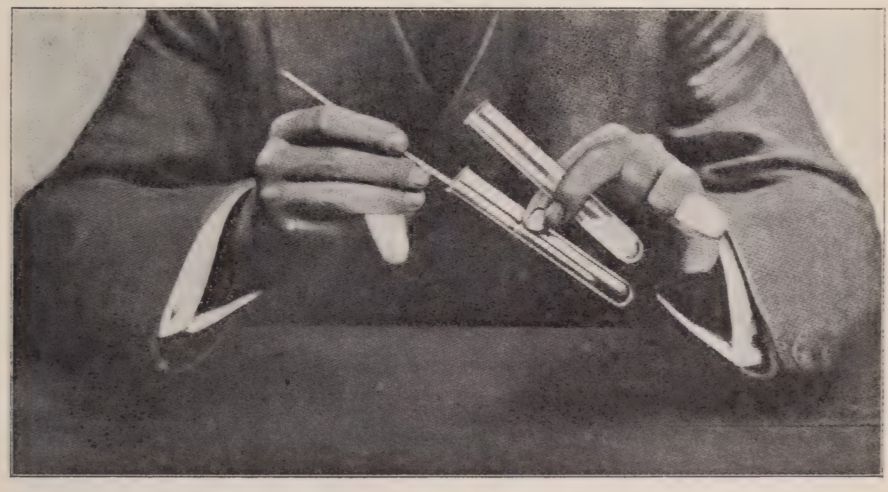

Fig. 2.

into broth tube 6, and so on. The actual test, therefore, occupies 17 minutes, and provides for six 2½-minute periods of contact in each of the five medication tubes.

It is open to the worker, of course, to adopt any convenient method of manipulating the tubes and plugs. The following procedure is given for the guidance of the inexperienced. (See Fig. 2). The first medication tube is taken from the rack and the contents gently agitated for a second to ensure even distribution of the bacilli; the plug having been taken out and grasped by the left little finger, the tube is held between the back of the left forefinger and front of the second. The corresponding broth tube (No. 1) is taken up by the right hand and transferred to the left between the thumb and forefinger, the plug being extracted and held by the little finger of the right hand. The tubes now being in position for inoculation, the needle, which should have been sterilized before the tubes were touched, is introduced into the medication tube, from which a loopful is taken and inoculated into the broth tube. The needle is sterilized in the flame, (placed to the right) and pushed with a movement of the thumb well up between the first and second fingers of the right hand; the plugs are then replaced, the medication tube going back to the rack while the broth tube is subjected to a gentle agitation and placed in a wire basket on the right of the rack. This basket containing the thirty inoculation tubes and test form giving particulars of the dilutions, etc., is now placed in the incubator where it is allowed to remain for 48 hours at blood heat, when the results are read off. A moment's consideration of the manner in which the test has been conducted will suffice to indicate where the results of each subculture should be placed in the table.

The following details of a test of pyxol show the form in which the results are set out; incidentally it shows the degree of refinement to which the test can be carried with a little practice and care. (See page 581.)

The strength or efficiency of the disinfectant under test is expressed in multiples of carbolic acid, and is obtained by dividing the dilution of the disinfectant showing life in 2½ and 5 minutes by the carbolic acid dilution, which, of course, must show the same result. In the present instance this 'figure of merit', or Rideal-Walker coefficient is 20.0.

To avoid annoyance and loss of time caused by aerial contamination of tubes, etc., it is advisable to conduct the test in a room free from draughts; a further safeguard is provided by spraying or swabbing the floors and benches with an efficient disinfectant solution. Needless to add, all pipettes etc., must be rigorously sterilized before use.

B. TYPHOSUS, 24 HOURS' BROTH CULTURE AT 37° C.

Temperature of Medication 15° to 18° C.

Sample.	Dilutions.	Time culture exposed to action of disinfectant—minutes.						Sub-Cultures.	
		$2\frac{1}{2}$	5	$7\frac{1}{2}$	10	$12\frac{1}{2}$	15	Period of Incub.	Temp.
Pyxol...........	1 : 1900	x	......	......	......	......	......	48 hours	37° C
Pyxol...........	1 : 2000	x	x	......	......	......	......	"	"
Pyxol...........	1 : 2100	x	x	x	......	......	......	"	"
Pyxol...........	1 : 2200	x	x	x	x	......	......	"	"
Carbolic Acid....	1 : 100	x	x	......	......	......	......	"	"

∴ Rideal-Walker Coefficient $\frac{2000}{100} = 20.0$.

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STANDARDIZATION OF DISINFECTANTS:

Some Suggested Modifications.

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Detroit, Mich.

As sources of infection and modes of contagion become more generally known, so also the need for efficient disinfection is more generally appreciated. For many years carbolic acid or phenol proper was the first and almost the only substance thought of as a real germicide, other substances, as copperas and chloride of lime, being commonly recognized as deodorants only. Sophistication of these agents was probably not practiced to any considerable extent.

The advent of proprietary articles for disinfection opened the way for the exploitation of more or less valuable substances of a similar character to phenol but with claims of greatly increased germicidal value. The question naturally arose: Are they more or less valuable than carbolic acid in the recommended dilutions?

So insistent is this question that bacteriologists vie with each other in suggesting methods by which the value can be determined. From the Garnet Method of Krönig and Paul to the latest one to be proposed, that described in *Bulletin 82* of the Hygienic Laboratory is a long step. This development, however, has been a process of evolution. The methods now employed are modifications of the fundamental principle first published by Rideal and Walker (*Journ. Royal San. Inst.*, 1906) that the value of a disinfectant can best be determined in the laboratory by exposing filtered bacteria suspended in culture medium to the action of the diluted disinfectant, the maximum efficient dilutions of sample and of pure phenol being compared to determine the coefficient of the sample, a value which is necessarily relative.

Suggestions have been made by various workers to modify the details in the process. Blythe and others (*Journ. Soc. Chem. Ind.*, 1906) suggested the addition of organic matter; Chick (*Journ. of Hyg.*, 1908) that the velocity of the reaction between organism and disinfectant be used as a determining factor; the Lancet Commission (*London Lancet*, 1909), the use of B. *coli communis* in bile salts medium as the organism; Anderson and McClintic (*Bulletin 82*, Hygienic Laboratory) without suggesting any radical change, reviewed the published methods and adopted from them, those details which, when slightly modified, seemed to them to meet the requirements for a simple and accurate method. This is a logical course to pursue and since the Hygienic Laboratory Method, as its authors prefer to call it, has been recommended by the Committee of the American Public Health Association for adoption and has in fact been adopted by some of the State Boards of Health, it seems advisable to suggest at once any changes which will simplify, shorten or improve the process of standardizing disinfectants.

The authors of this paper contributed to the literature on the subject (*Am. Journ. of Public Health*, 1912), a description of the method in use for ten years in the laboratory of Parke, Davis & Co. for standardizing disinfectants. Since the publication of the Hygienic Laboratory Method, both methods have been used as a means of becoming familiar with the details of the latter and of comparing the results obtained by each.

In the course of this work, various modifications have suggested themselves, some of which seem of sufficient value to be published.

Organism. Without any question it is essential that the same strain of the same organism must be used in order to insure uniformity in results. The coefficient obtained with one strain of *B. typhosus* may be 50 per cent. to 100 per cent. higher than that obtained by using another. Even the same strain,—*B. typhosus* (Hopkins), obtained from the Hygienic Laboratory—changed in its relative resistance toward phenol and other coal tar disinfectants to such an extent that coefficients obtained with it as the test organism were 50 per cent. higher than with a fresh culture.

Without special precautions and even in spite of such precautions a culture may change imperceptibly until the results with it are not comparable with the values previously obtained.

Whether the facts above noted are peculiar to the Hopkins culture or to its being grown in the culture medium adopted by the Committee for the Bacteriological Standardization of Disinfectants, this being the one used by Anderson and McClintic, has not yet been determined. A later publication will take up this phase of the problem.

Temperature. Experiments have been conducted which prove that more uniform results may be obtained from day to day by working at a constant temperature. Within reasonable temperature limits the coefficient at different temperatures remains fairly constant because of testing the standard under the same condition. But since the temperature factor is considered of importance by most writers this feature may be adopted, the advantage to be gained, however, is not in accuracy but in uniformity in daily results.

Seeding Tubes. The use of wide seeding tubes recommended by the Lancet Commission and incorporated in the Hygienic Laboratory Method gives greater opportunity for accidental contamination. This, however, may not be serious since if not too frequent the illogical results occasioned by this factor are easily detected and can be ignored in drawing conclusions.

Temperature Adjustment. When the wide tubes are used and the temperature is to be adjusted as first recommended by Rideal and Walker a convenient way to carry it out is to have a sheet iron pan three inches deep and of such dimensions that the perforated block suggested in *Bulletin 82*, Hygienic Laboratory, will exactly cover it and rest on its edges (see Fig. 1). Such a pan will hold sufficient water to keep an even temperature for an hour—the time required to test 60 dilutions for a period of 15 minutes each. The block must be modified by being made only seven eighths of an inch thick and have the holes bored through. When placed on any flat surface, the seeding tubes will stand upright in a convenient position for filling. After filling the measured disinfectant solution into the tubes, the board can be placed over the pan for the succeeding steps of seeding and subculturing. The tubes will pass through the holes to a depth of two inches below the bottom of the board till held by the flange.

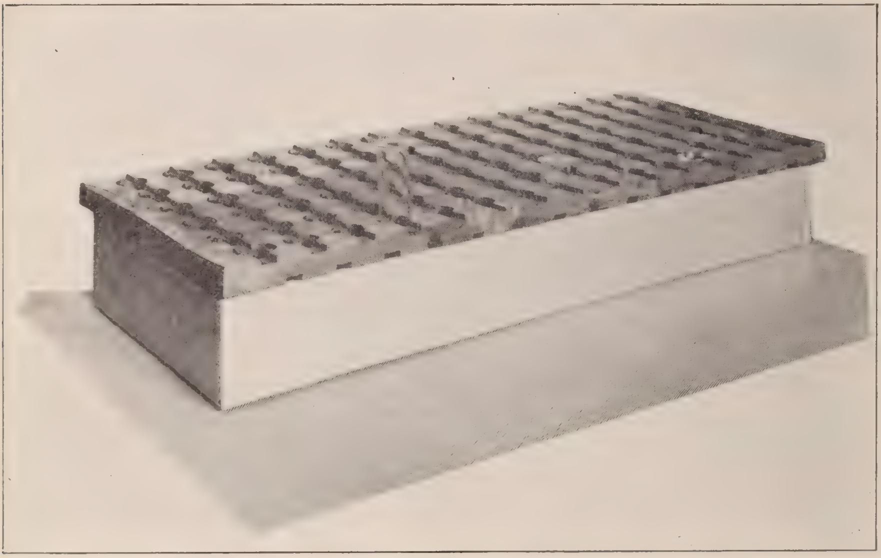


Fig. 1.

Sterilizing Loops. Two simple adaptions of the Lancet Method for sterilizing the platinum loops have been used. One of these (see Fig. 2), consists of a firmly supported slab of asbestos placed in a slightly inclined position. At the higher edge of this slab a disk of sheet iron bent at right angles along its diameter is fastened in such a way that the handle of the loop will lie in the bend in a horizontal position at such a height as to be in the flame of a fish tail burner. A spring under one side will raise that side slightly above the horizontal to keep the loop over the flame. A slight pressure will depress the disk enough to roll the loop off after which the disk returns to the position for holding the next loop. The sterilized loop rolls down the slightly inclined slab to an obstruction or to the loop previously sterilized. A cut-out in the asbestos slab under the handles of the loops makes it easier to pick them up. This simple apparatus has several points in its favor: 1st, it requires only one small flame for sterilizing; 2d, the wire is never heated more than 15 seconds; 3d, the coolest wire is always nearest to the operator; 4th, only one hand is needed to operate it, since the flame is stationary; 5th, the whole apparatus can be devised from apparatus and material at hand in any laboratory.

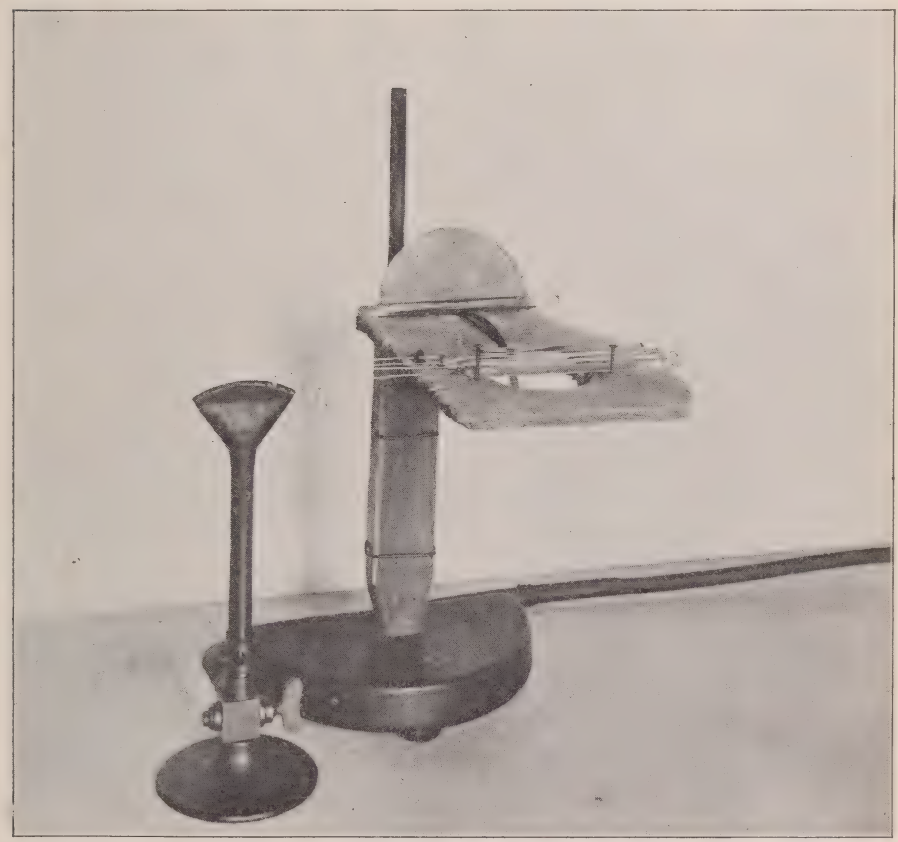


Fig. 2.

The other method illustrated (see Fig. 3) makes use of a revolving holder for the platinum loops. The axis of this holder is the Bunsen burner tube. The handles of the loops are held upright in a slot in which they can be tilted so the loop is either in or out of the flame. Very few movements are necessary to operate this method and it has several advantages over others. One of these is that there is nothing to get out of order, another, that a blue flame is used, thus avoiding the formation of carbon on the wires. This occurs occasionally with a fish tail burner and is very destructive to the wires.

Abridged Methods. When many dilutions are to be tested, especially when one knows approximately what dilutions of the disinfectant will not give growth at 2½ minutes and those that will allow growth after 15 minutes, it is possible to shorten the time of testing and to use fewer tubes of culture medium by discarding the strong dilutions after one or more subculture have been taken out, and substitute the weaker dilutions which would certainly have given growth if subcultures had been planted after only short exposures.

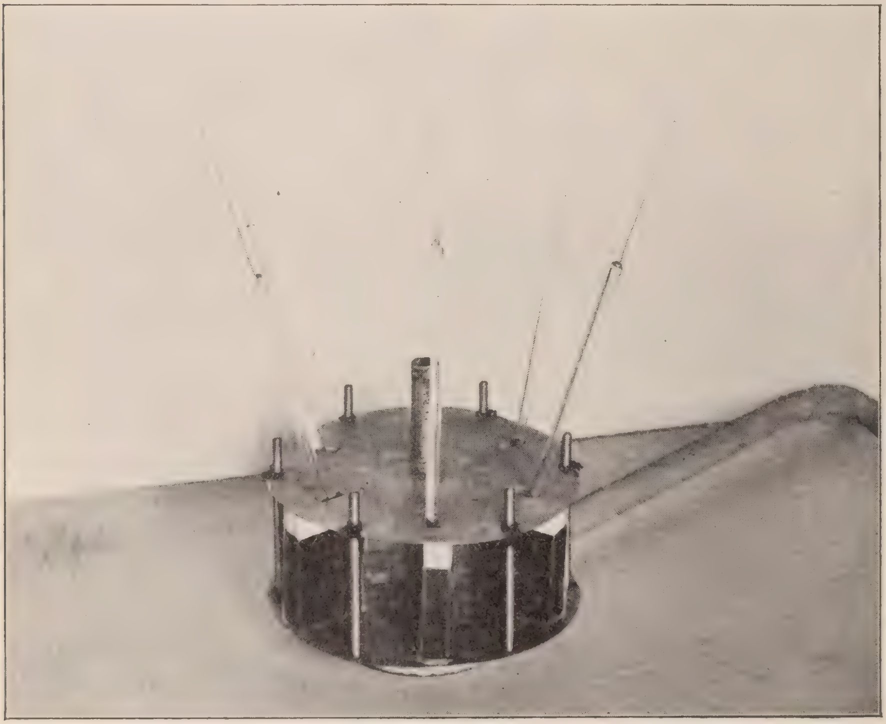


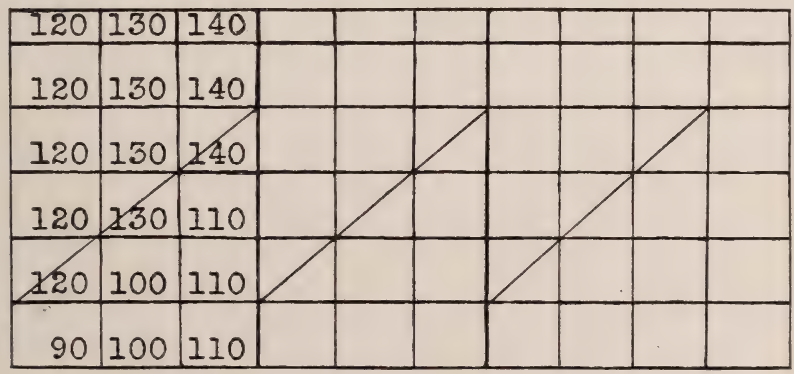
Fig. 3.

First. A scheme was outlined to set two rows of ten seeding tubes, each with dilutions of the disinfectants to be tested. If dilutions of phenol and two disinfectants are to be tested, the twenty seeding tubes containing them may be arranged in the board as follows:

Phenol			A			B			
120	130	140	500	550	600	1600	1700	1800	1900
90	100	110	350	400	450	1200	1300	1400	1500
1	2	3	4	5	6	7	8	9	10

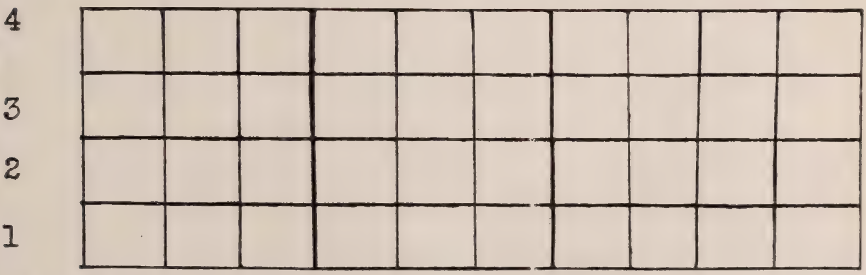
The "90 dilution" is seeded first and during the 15 seconds allowed for that step, the "120 dilution" is also seeded; then the 100 and the 130 dilutions during the second 15-second period. An assistant is needed to shake the tubes before returning them to their proper locations. When all have been seeded in the $2\frac{1}{2}$ minute period, then a subculture is taken from each tube in the lower row. After this, tube 120 is substituted for 90, 500 for 350, and 1600 for 1200. After the 5-minute subcultures have been planted, 130 is substituted for 100, 550 for 400 and 1700 for 1300. After the $7\frac{1}{2}$-minute subcultures have been planted, then 140 is substituted for 110, 600 for 450 and 1800 for 1400. After the 10-minute subcultures have been planted 1900 is substituted for 1500 and no further changes are necessary.

The results can best be recorded by using a diagram representing the rack containing the subcultures, the diagonal line passing through the first subculture of the higher dilution.



120	130	140							
120	130	140							
120	130	140							
120	130	110							
120	100	110							
90	100	110							

Second. This was later further shortened by making subcultures only at $2\frac{1}{2}$-minutes and 15 minutes, according to the following scheme.



4 and 3: $2\frac{1}{2}$ minutes. 2 and 1: 15 minutes.

In the rows 1 and 2 are placed the seeding tubes containing such dilutions of the disinfectants as should show both growth and no growth in 15 minutes. In rows 3 and 4, such dilutions as should show both growth and no growth in $2\frac{1}{2}$ minutes. The rows are seeded in order, 1, then 2, then 3, after which subcultures are taken from 3. Then 4 is seeded and immediately subcultured. Then the first and second rows are subcultured successively.

By this scheme only 20 minutes are required to seed and subculture 40 dilutions and only 40 tubes of medium are needed.

All the data necessary for the coefficient is obtained by this method since the coefficient is based entirely on the greatest dilutions which kill the bacteria in $2\frac{1}{2}$ and 15 minutes. One can choose either a great range in dilutions or have check dilutions, since no time is gained by having fewer than 40 dilutions.

The only objection to be advanced against these abridged methods is that without the results between the $2\frac{1}{2}$ and the 15-minute subcultures, wrong conclusions may be drawn. These, however, are corrected by check tests.

The foregoing points are offered, not as criticisms on any method, but suggestions applicable to methods commonly used. They may be helpful to others as they have been to us in simplifying and shortening an irksome process.—*From the Research Laboratory of Parke, Davis & Co., Detroit, Mich.*

THE BACILLUS OF WHOOPING COUGH AND THE LESION IT PRODUCES.

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Read before the Massachusetts Association of Boards of Health, Boston, Mass, April 24, 1913.

Last summer, while going over the autopsy from a case of whooping cough microscopically with one of the internes, I made the observation that between the cilia lining the trachea there seemed to be innumerable minute organisms present. That was the starting point of the investigations which I have the pleasure of reporting to you today. I will speak very briefly of the first historical side of whooping cough from the pathological point of view and then demonstrate what we have found.

In 1890 Bordet and Gengou discovered an organism in all of the acute cases of whooping cough which they examined, but it was not until 1896 that they were able to obtain the organism in pure culture. They were also able by using an emulsion of the organism and serum from the patient's blood to get a complement fixation test. That fact showed pretty conclusively that the patient produced an antibody for the organism, and that has been the basis of the proof since that the organism causes the disease. But although the bacillus is generally accepted by the bacteriologists as the cause of whooping cough, it has not been accepted to any extent by the medical profession, because no lesion was ever demonstrated in connection with the organism, only the organism in connection with the disease.

In 1908 Klimenko repeated the work which Bordet and Gengou had done, confirmed their results, and made certain experiments with pure cultures on animals. He inoculated about thirty puppies and a few monkeys and studied their symptoms. The puppies nearly all died in the course of a few weeks. They developed coughing and sneezing but never whooped. After the animals died or were killed he was able to obtain the pertussis bacillus again from them in pure culture.

The organism is exceedingly minute and looks a good deal like the influenza bacillus, but it does not require hemoglobin in order to grow. On the other hand the only medium on which it is possible to start it multiplying is a potato-blood-agar mixture devised by Bordet. The bacillus grows very slowly at first and forms minute transparent colonies which in time enlarge and acquire a slight brownish color, but not very much.

After a certain amount of artificial cultivation it can be grown to some extent on other media.

The bacillus is Gram-negative, non-motile and varies in shape from round to oval.

Figure 1 shows the lesion we found in the trachea of a child who died from whooping cough at the end of two weeks. Masses of minute bacilli are packed in between the cilia of the epithelial cells. They number dozens to a hundred or more over each cell. Figure 2 shows them more highly magnified so that the separate organisms can be made out distinctly.

The bacilli seem to act mechanically only. They interfere with the action of the cilia and thus furnish a continuous irritation which excites coughing of a spasmodic type. Finally the coughing, which is not able to remove the organisms, is followed by a violent intake of air, the whoop.

Figure 3 is from the trachea of a patient who survived six weeks. A few bacilli are still present between the cilia but most of them have disappeared.

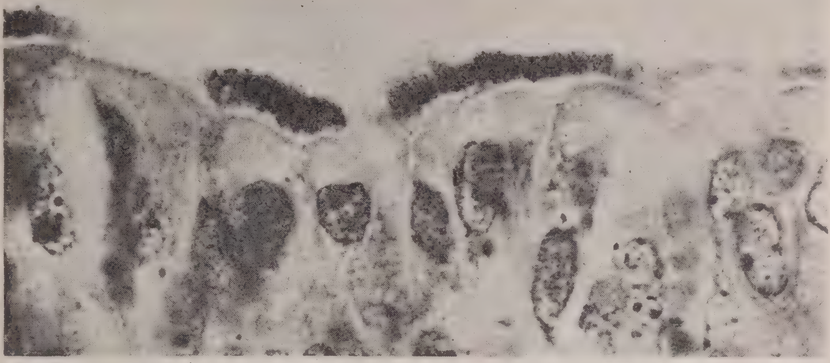
Examination of some lung tissue preserved from a case of whooping cough which came to autopsy fifteen years ago showed masses of similar organisms in the same characteristic position between the cilia of the epithelial cells lining the bronchi.

It has been possible to study lung tissue from two other cases of whooping cough and in both of them the same lesion was found. The organisms occur only between the cilia and occasionally free in the secretion. They were never found within the air sacs. In two of the cases studied, bronchopneumonia was present, but it was due to a secondary invader, the pneumococcus, not to the whooping cough bacillus.

While the action of the organism is chiefly mechanical it evidently secretes a certain amount of toxin. This is shown in three ways. There is a slight inflammatory reaction. Leucocytes in small numbers migrate through the wall of the trachea. The blood of whooping cough patients always shows a certain degree of lymphocytosis. Finally the blood serum develops an antibody which renders it possible to obtain a complement fixation test.

The finding of these lesions in human beings naturally suggested experimental work on animals. We first inoculated sputum obtained from acute cases of whooping cough into the trachea of a puppy and also into that of a rabbit. In both instances we obtained a lesion corresponding in every way to that found in human beings as these two lantern slides clearly demonstrate.

We next set about obtaining pure cultures and after considerable effort succeeded in doing so. We found that the easiest way to inoculate an animal with the organism was to make a suspension in bouillon and then pour it gently a drop at a time into the animal's nostrils. In this way it was compelled to inhale more or less of the culture.



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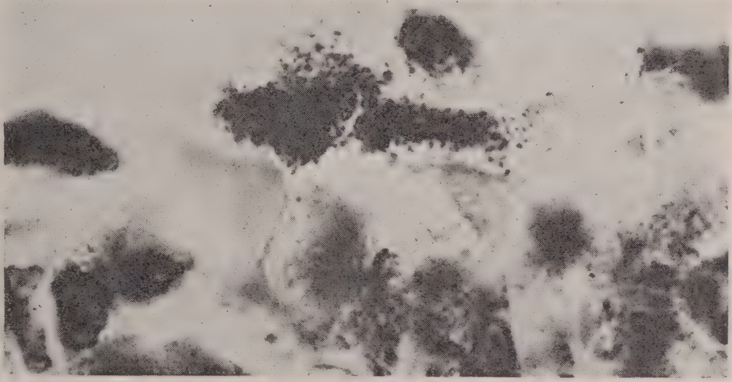

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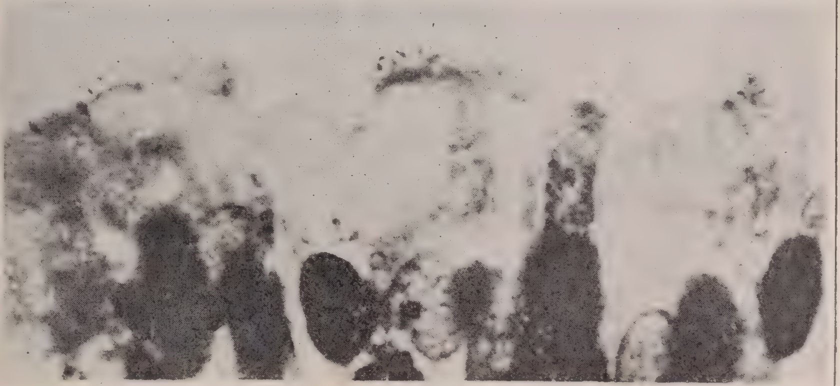

3

Fig. 1.—Ciliated epithelium lining trachea of child dying in acute stage of whooping cough. Masses of minute bacilli present between cilia. x 1,000.

Fig. 2.—Ciliated epithelium lining trachea from same case. x 1,500.

Fig. 3.—Ciliated epithelium lining trachea from child dying at a late stage of whooping cough. Bacilli still present in small numbers between the cilia. x 1,500.

We were able in this way to duplicate in puppies and rabbits the lesions which we had found in the human cases. Finally we used for inoculation purposes a strain of organism which came originally from Bordet and with it obtained the same result.

The work on human beings has been controlled by the study of dozens, I might say of hundreds, of cases. There is no question about the organism occurring in whooping cough and not in any other disease, and of its relation to the lesion. Up to three days ago it seemed as though the work on animals was equally sure, but on that date Dr. L. J. Rhea, who was interested in the distemper in dogs, examined the trachea from a dog which died of that disease and made the interesting but unfortunate discovery that a similar organism is present between the cilia of the cells lining the trachea and bronchi. In other words, we have in these animals, that is in the dog, and in rabbits, guinea pigs and cats, a lesion produced by an organism closely resembling that which causes whooping cough in man. His observation necessarily throws a certain amount of doubt on our experimental work and also in Klimenko's because, although we started with the whooping cough bacillus and got it back, as we believed, in pure culture again, the lesion which we have been examining may have been produced by this other organism. There is no way of telling them apart histologically in sections. It means that this part of the work, the experimental part, will have to be done over again. We must control our work more carefully, being sure, in the first place, if we possibly can be, that the animals are not infected with the bacillus bronchisepticus, as it is called, and getting back beyond question the bacillus of pertussis. The two organisms look much alike, when grown on Bordet's medium, but they can be distinguished by the use of special media, especially of litmus milk, because the bronchisepticus produces a great deal of alkali and turns the milk intensely blue. It is also motile and the whooping cough bacillus is not.

It is unfortunate but that is the present state of the question. The work has at least called attention, however, to a peculiar lesion which occurs not only in whooping cough but in the distemper of animals. The two organisms will have to be investigated more thoroughly and their relation to each other ascertained.

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

The quarterly meeting of the Massachusetts Association of Boards of Health was held at the Brunswick Hotel, Boston, Thursday, April 24, 1913, under the presidency of Dr. Samuel H. Durgin.

Report of Legislative Committee.

Up to this time but little legislation of interest to local boards of health has been enacted by the present Legislature. In this class there are but three new laws, which are:

Chapter 210. An Act providing that local boards of health make weekly reports on certain diseases to the state board of health.

Chapter 265. An Act providing for the exclusion of certain deleterious substances from confectionery.

Chapter 278. An Act authorizing counties to provide facilities for bacteriological diagnosis.

The several bills calling for reorganization of the state board of health have not been reported upon by the Public Health Committee though the hearings on them were closed March 7.

The bill seeking to provide for appeals from decisions of local boards of health was given leave to withdraw; this was also the case with the bill which sought to change the determination of settlements from the overseers of the poor to local boards of health.

As regards milk legislation, the Ellis Bill, House 393, was reported unfavorably by the Joint Committee on Agriculture and Public Health, which report was yesterday accepted in the House of Representatives by a vote of 130 to 87.

The bill introduced by the Legislative Committee of this Association providing a state standard for clean milk was given a favorable report by unanimous vote of the joint committee and is now at the third reading stage in the Senate.

This bill is now Senate 492 and in view of the probable failure of other milk measures at the present session your committee urges the members of this Association to assist in the passage of this particular bill.

George E. Bolling,
Chairman.

On motion, the report was accepted and placed on file.

NEW MEMBERS.

The following gentlemen were elected to membership in the Association: John E. Drury, Lowell Board of Health; Carl Beede, Wellesley Board of Health; Robert N. Hoyt, agent, Wellesley Board of Health; Dr. John W. Pratt, Dedham Board of Health; Dr. Arthur Worthington, Dedham Board of Health; Dr. Joseph Francis Golden, Stoughton Board of Health; Frank W. Jackson, Brockton Board of Health; Dr. J. H. Burkhead, Middleboro Board of Health.

PAPERS PRESENTED.

The following papers were then read:

"The Bacillus of Whooping Cough and the Lesion it Produces" by F. B. Mallory, M. D., Boston, Mass. (Printed in this issue of the *Journal.*)

"Whooping Cough, A Plea for More Efficient Public Regulations Relative to the Control of this Most Serious and Fatal Disease," by John Lovett Morse, M.D., Boston, Mass. (Printed in the *Journal of the American Medical Association, May 31, 1913, p. 1677.*)

REPORT OF THE COMMITTEE ON UNIFORM HEALTH REPORTS.

The report of the Committee on Uniform Health Reports was then presented by Dr. C. V. Chapin, the chairman of the committee. It was moved that the report be received and that 500 copies be printed at the expense of the Association and put into the hands of the treasurer for distribution to every board of health in the Commonwealth of Massachusetts. The motion was seconded and carried.

The report of this committee appears in full elsewhere in this issue.

MEMBERSHIP COMMITTEE.

It was moved that Professor Sedgwick, Mr. Coffey and Professor Rosenau be appointed a committee to circularize the boards of health in the state of Massachusetts to secure membership for this Association.

The motion was seconded and carried.

There being no further business, the meeting then adjourned.

REPORT OF COMMITTEE OF THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH ON UNIFORM HEALTH REPORTS.

Presented to the Massachusetts Association of Boards of Health, April 24, 1913

The Committee on Uniform Health Reports was appointed at the suggestion of Prof. Selskar M. Gunn who presented to this Association at the January meeting, 1911, a paper on "Modern Board of Health Methods in Small Cities." In the preparation of the paper the writer had occasion to study the reports of fifty-six of the smaller cities of the United States, and found it impossible to obtain from them the data he desired.

It may perhaps seem to the Association that this committee has been dilatory in preparing the report, but it was found that the subject was one which required very careful consideration. Many long sessions were held and various points involved were discussed with local health officers in Massachusetts, some of whom have taken the trouble to be present at the meetings. The committee has also carried on a considerable correspondence with federal officials and with other persons interested in the subject.

Every one who has ever attempted to study any phase of public health work in the reports of the local health officers has had a most discouraging experience. The reports seem usually to be prepared without plan. Not only do they differ from one another in different cities but are for the same city, for different years, greatly unlike. While the majority of them are for the calendar year many are not, and even if they contain good tables of vital statistics, they are of no value for comparative purposes. Most reports are very unsatisfactory as regards their statistical tables as is well illustrated by the fact that twenty-four of

(This report is printed so that the size of the type page is that recommended for Health Department Reports).

the fifty-six reports above referred to, failed to give the population, and most of them arranged the causes of death alphabetically instead of according to the International Classification which has now been official in this country for over a decade. Not long since a member of this committee wished to learn the number of cases of scarlet fever and diphtheria for the last ten years in the principal cities of the country. It might be thought that an exact statement of the prevalence of these diseases would certainly be found in every health report, but the desired data could be obtained from less than half the reports of our most important cities. It is rare indeed to find a financial statement which is satisfactory or even intelligible, and a comparative study of expenses, based on health reports, is entirely out of the question. It has been argued that the local health official is not called upon to give information for the use of other cities, but we are all constantly learning from one another, and efficiency requires that every health officer, and every municipality, should furnish to others a clear account of what is being done to protect the public health. And in any event the same plan of report, the same material, and the same care in preparation, are necessary for the enlightenment of the citizens in one's own city, as for the information of health officers in other municipalities. Every citizen is entitled to know just what his health officials are doing, how much each phase of public health work costs, and the prevalence of different diseases, and he should be able to compare the data with those for preceding years. It was to facilitate the preparation of useful reports, and to suggest a certain necessary degree of uniformity, that this committee was appointed, and we accordingly present the following plan, or sketch, of a report, of which the accompanying tables are perhaps the most essential feature. Although the committee was appointed by the Massachusetts Association of Boards of Health, it has believed that it ought not to confine its attention to local conditions and needs and has therefore sought the assistance of the United States Public Health Service and of the Census Bureau and of a number of persons in different parts of the country who are actively interested in the promotion of public health.

While a certain degree of uniformity in health reports is desirable, the committee wishes strongly to emphasize the danger of too great uniformity. At the present time many of the most active leaders and promoters in the field of public hygiene, have, as one of their chief aims, the promotion of uniformity in public health work. While more uniformity is desirable in some directions, there is great danger that the tremendous authority which universal custom gives to any procedure will stifle all initiative and experiment, and will so crystallize the practice of the time that the art of sanitation will fail to respond to the teachings of sanitary science. If greater uniformity in reports should encourage the health officer in complacently following the routine practice of other communities, it would be better to allow the present confusion of our reports to continue. Even the particular forms recommended by the committee are not intended to be absolutely binding or perpetual. Individual officers should, it is true, waive merely minor personal preferences or local custom, in order to align their reports with others, but if, after careful consideration, an officer devises what he believes a more efficient presentation, it will be in the line of progress to make use of it. While changes in the scheme of formal reports are always to be deprecated, additions are ever welcome. Progressive officials will continue to strike out on new lines of work and the result should always be presented with care and fullness in their reports.

The accompanying scheme for a report has been worked out primarily for cities of moderate size. To officials in small communities it may at first sight seem too elaborate for their use, but it is so only in appearance. Such officials will simply report on the work which is performed in their own communities, and omit whatever does not apply to their department. Many cities on the other hand may perform functions not referred to in the committee's scheme, and the health reports of such would be expanded accordingly.

The committee most urgently requests all health officers, and particularly those of the smaller communities, not to be alarmed at the size of this report, or at the apparently elaborate scheme presented. It would have been folly to present a scheme which would not include the great bulk of public health work. It is believed that the scheme can be as easily followed in a health report of eight pages as in one of eighty pages.

Let no health officer, of even the smallest town, cast aside this scheme until he has compared his last report with it and noted how little additional work would be required, and what small additions would be necessary, in order to bring his report into alignment with it.

Where there is a health officer giving only a part of his time to the work, and no other employees, the report would consist of a short financial statement giving the appropriation and the expenditures, which, besides the health officer's salary, should specify the few additional expenses according to their purpose as indicated in the schedule. Then should follow a brief account of the health officer's work in the order shown. A few figures as to inspections, visits, etc., might be inserted in appropriate places. In connection with contagious diseases there should certainly be given a table of cases and deaths for ten years. Lastly there should be given the vital statistics. In a small place, where the births, deaths and marriages are few, it is not much work to prepare these tables.

If the health officer gives all his time to the work, or if a school inspector, or bacteriologist, or milk inspector, is employed, one after another of the headings in the scheme will be found to be useful and will be successively added to his report and the appropriate tables will be included. Thus the size and complexity of the report will grow with the amount and complexity of the work.

With this introduction the committee submit the following report which consists of:

I. A form for a report suitable for a well organized health department such as should be found in cities of 30,000 inhabitants and over and sometimes is found in smaller places.

II. A form for reports for smaller places.

III. Notes explaining in some detail what is demanded by various items in the scheme and giving some of the reasons for the recommendations.

IV. Model tables.

Charles V. Chapin, M. D., *Chairman.*
Francis Geo. Curtis, M. D.
William H. Davis, M. D.
Selskar M. Gunn.
William C. Hanson, M. D.

SUGGESTIONS FOR UNIFORM HEALTH REPORTS.

1. Main titles are essential and should be included in all reports. Subtitles are suggestions for subdivisions of main titles and may be still further amplified if desired. The main titles should be used in the body of the report as headings for the corresponding subjects.

2. The different subjects considered in the report should have the same relative position each year.

3. When a title covers work which locally comes under the jurisdiction of another department, the fact should be noted under that title, and if possible, some information should be given.

4. When a title covers a subject in which no work has been done during the year, the fact should be noted.

5. If the report covers more than fifty pages, an index, or at least a table of contents, should be included.

6. The size of the report should be 9 x 6 inches, unless a local ordinance prescribes a different size. This will allow about $6\frac{1}{2}$x$3\frac{3}{4}$ inches for the printed page. Do not use a

folded insert if it can be avoided. Tables should be vertical if possible.

7. The report should be mailed flat, not rolled or folded.

Amplified Form for Cities of 30,000 or Over.

A. TITLE PAGE.

B. NAMES AND ADDRESSES OF MEMBERS OF THE BOARD.
  Executive Officer.
  Heads of Divisions.

C. FINANCIAL STATEMENT.

Table I.

D. DISEASES DANGEROUS TO THE PUBLIC HEALTH.*

1. Methods for protection of community.
2. Brief comments on prevalence of each disease during the year, including accounts of outbreaks.

Table II.

Table III.

3. Bacteriological Laboratory.
   Examinations for diphtheria: diagnosis and release.
   Examinations for typhoid fever, tuberculosis, malaria, etc.—Special Work.
4. Isolation Hospital.
   Number of cases of each disease treated—results.
   Percentage removed to Hospital.
   Return cases.
   Per capita cost.
   Average length of stay in hospital for each disease.
   (Living cases and deaths tabulated separately.)

Table IV.

5. Care of cases outside of Hospital.
6. Control of Tuberculosis.
7. Distribution of Antitoxin.
   Administration of Antitoxin—results.

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* In Massachusetts this term is prescribed by statute, and includes all those diseases notice of which must be sent to the local and state Boards of Health. (See List published by State Board of Health).

8. Vaccination.
9. Disinfection.
    Methods.
    Cost.
10. Maritime Quarantine.

E. INFANT MORTALITY.
    Milk stations.
    Nurses, etc.
                Table V.

F. SCHOOL INSPECTION.
    (State whether school or calendar year is covered.)
    Details of work.
        School physician's report.
                Table VI.
        School nurse's report.
                Table VII.

G. FOOD INSPECTION.
1. Dairy inspection.
    Dairy inspector's reports.
2. Milk inspection.
    Milk inspector's report.
    Laboratory work.
    Samples examined { chemically. / bacteriologically.
                Table VIII.
                Table IX.
                Table X.
3. Ice cream.
4. Vinegar inspection.*
    Inspector's report.
5. Bakeries.
6. Drug inspection.
7. Meat and provision inspection.
    Inspector's report.
8. Inspection of slaughterhouse and of animals at the time of slaughtering.
    Inspector's report.

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* Required by the Massachusetts statutes.

H. NUISANCES.

Any special work which needs to be noted.

I. MUNICIPAL WASTES.

House offal and garbage.

(Define term. Give figures in tons or cubic yards, not loads.)

Method of collection.

By municipality—by contract—by individuals—how often.

Method of disposal.

By burning—by burying—by feeding to swine—by sale—by dumping at sea, etc.

Cost of work.

(Make distinction between cost of collection and disposal, when possible.)

Ashes and combustible waste.

(If separated, note fact.)

Table XI.

J. INSPECTION OF PLUMBING.

K. RESEARCH, EDUCATIONAL AND PUBLICITY WORK.

L. OTHER WORK DONE DURING THE YEAR.

(This title should cover all work done by the Board of Health not included in other titles, and each subject should be treated separately.)

M. RULES PASSED SINCE LAST REPORT.

N. LOCAL PROBLEMS.

O. RECOMMENDATIONS.

P. VITAL STATISTICS.

Tables XII to XVI.

Simplified Form.

A. TITLE PAGE.

B. NAMES OF MEMBERS OF BOARD.

(In small towns where Selectmen act as Board, give name of Agent or Executive Officer, with office hours, if necessary.)

C. FINANCIAL STATEMENT.

Table I.

D. DISEASES DANGEROUS TO THE PUBLIC HEALTH.*
  Give short account of the occurrence during the year.
    Table II.
    Table III.
E. INFANT MORTALITY.
    Table V.
F. SCHOOL INSPECTION.
    Table VI.
    Table VII.
G. FOOD INSPECTION.
  Special reference to milk and dairy inspection.
    Table VIII.
    Tables IX. and X.
H. NUISANCES.
I. MUNICIPAL WASTES.
  Garbage.
  Ashes.
J. INSPECTION OF PLUMBING.
L. OTHER WORK DONE DURING THE YEAR.
M. RULES PASSED SINCE LAST REPORT.
P. VITAL STATISTICS.
    Table XII.
    Table XIII.

(State whether population is census or estimated: if estimated follow directions on page 614.

NOTES ON SCHEME FOR REPORTS.

A. Always indicate clearly whether the calendar year or some other year is covered by the report. It is very desirable that all reports be made to cover the calendar year. This is the custom in most cities and those which do not conform to it can usually easily arrange to do so. It is more difficult to make the financial statement fit the calendar year if the city government has made provision for a fiscal year differing from the calendar year, but in such cases there is little objection to having the fiscal table cover a period different from the calendar year. So, too, in school statistics, it is usually simpler, and it is the custom, to make use of the school year rather than the calendar year. For statistics relating to communicable diseases, and for vital statistics, as ordinarily understood, it is very important for purposes of comparison with other places, that a calendar year should be used. In every instance where the calendar year is not made use of *it should be plainly stated.*

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* In Massachusetts this term is required by Statute and includes all diseases, notices of which must be sent to local Board of Health. (See List published by State Board of Health.)

B. It is an equal convenience to citizens, and to officials in other cities, to find in each report a list of all the officers and employees of the department. It is entirely feasible to print such a list if the city is not too large. If the number of employees is so large that heads of divisions or bureaus are appointed, it will probably not be desirable to print the names of all employees, but merely of the heads of divisions, so that citizens and correspondents may know to whom to apply for information. When this is the case, it is desirable when reporting on the work of each division, to give the *number* of employees, such as inspectors, physicians, nurses, division clerks, etc., employed in each division. On the other hand, in a small town where the selectmen are the board of health with only one health official, all that would be necessary is the name and address, and perhaps office hours, of the health officer.

C. The chief value of the financial statement of a health report is in showing for just what purposes the taxpayers' money is expended. Many reports merely give a list of bills paid, which is all right for the auditor, but is pure waste of time and space so far as the health department is concerned. Other reports, while giving the amounts expended for various purposes, classify these in such a way that the report is of little use to any one and not comparable with the financial statements of other cities. The most important functions of the health department are indicated in the committee's scheme for the general report and the same headings, though not necessarily with exactly the same subheadings, or in exactly the same order, should appear in the financial statement. While it is the purpose of the financial statement to show the cost of the different kinds of public health work, it is recognized that it is very difficult if not impossible to distribute certain expenditures in this way. Hence some of these general expenses have been grouped in the proposed financial statement, under "General Administration." It was found difficult to decide just what expenses should be placed here, and doubtless in some cities some of these items as postage, printing etc., might be distributed among the succeeding headings, but after careful consideration, the arrangement here presented was decided on and, for the sake of uniformity and to promote comparison, it is hoped that it will be generally followed. In most respects the committee's scheme recommends substantially the same distribution of expenses as that recommended by the Federal Census Bureau* except that the latter separates the expenses for publicity and education according to whether they are for the prevention of communicable diseases, the protection of child life, etc. Our committee believe that in most health offices this would be rather difficult and so have suggested placing all such expenses in a single item. The order, too, of Mr. Power's schedule, is slightly different. This committee's form of financial statement was designed to correspond as closely as possible with the usage of the Federal Census Bureau so that bureau may be able easily to utilize local health reports for its comparisons.

It is not by any means difficult or laborious to prepare a financial statement of this kind. By having a card for each heading such as *Postage*, *Laboratory*, *School Nurses*, *Mosquito Extermination*, etc., and, when each bill is paid, or pay roll prepared, entering the amount on the proper card or cards, very little time is consumed. In a city expending $60,000 a year it was found to take not more than six or eight hours in a year, and probably nearly as much time would have been consumed in preparing the meaningless sort of statement which usually appears in health reports.

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* See paper by G. L. Powers on Uniform Accounts, etc., published by the Census Bureau, 1912.

It is often desirable to compare the expenditures of the year with those of the previous year and it is suggested that this table have two columns for this purpose though it is not considered essential. The lines must be spaced farther apart so as the make the table easier to follow and it will then often be necessary to continue it on a second page to which there is no objection.

D. It ought to be possible by a perusal of the health reports of a city to learn the methods employed. It is not necessary, or in the line of economy, to print an extended description each year, but reference should be made to previous reports in which the workings of the department, or any of its divisions, are to be found. The introduction of new procedures, or modification of old ones, should always be noted with fullness and care. This is particularly important in connection with the management of communicable diseases, for the present time calls for a more critical study of these methods than they have ever received.

It is especially important that the prevalence of these diseases, for a series of years, if possible, should be made plain, and for this purpose the committee suggests certain standard tables. The table showing the number of cases and deaths from the different contagious diseases (Table III) should cover at least ten years if the data are available. Better still it should give the figures during the whole period of notification, by years if possible, but certainly by five year periods, as 1891–1895, 1896–1900, etc.

Among matters which it is important to discuss are duration of isolation, methods of maintaining isolation, and rules for determining the duration of isolation, the control of school children in the family, and of wage earners in the family, and the restrictions applied to other members of the family. If definite rules are in force they should be printed in the report for the year when adopted, and perhaps referred to in succeeding reports. The method of dealing with carriers, particularly with diphtheria and typhoid fever carriers, should be noted.

Any local outbreaks due to milk, to water, oysters, school attendance, carriers, contact, flies or any other cause, should be carefully reported. If such reports have been published elsewhere, as in a medical journal, it is economical to give merely the salient features and refer to the complete report.

Any wide spread prevalence of disease or change in severity should be noted. Outbreaks of unusual diseases as smallpox, cerebro-spinal-meningitis and poliomyelitis ought to be most carefully reported.

Outbreaks in institutions should be carefully reported.

The amount of bacteriological work should be given and unusual or research work should be described in detail. In referring to diphtheria cultures state whether nose or throat cultures, or both, are taken, So also in examinations for typhoid bacilli, state whether urine or feces, or both, were examined.

Cases of contagious disease *developing* outside of the community and brought in for treatment in hospitals or elsewhere should be included in Tables II and III, as should all cases *developing* in the community though *contracted* elsewhere.

If many cases which developed or were contracted outside of the city are brought into the city, it may often be desirable for epidemiological reasons to show these in a separate table. But such cases should of course be always included in Tables II and III.

Reports of American hospitals for communicable diseases are woefully deficient. It is usually impossible to learn from them even the proportion of cases removed to the hospital for the year of the report, yet such figures should be given not only for the current year but for a series of years. The duration of hospital isolation for living and for dead cases should be given for each disease. This is important for studying the per capita cost of hospital isolation and for the study of "return cases" and many other epidemiological problems. It occasionally happens that a case discharged from the hospital infects some one in the family when it returns home, thus giving rise to what are called "return cases." The study of these cases, and particularly of the "infecting cases," which cause them, throws much light upon such important subjects as duration of infection, the determination of infectivity, mode of infection, period of incubation, methods of prevention, etc. Every hospital should ascertain with great care the number of "infecting cases" discharged, and should report them fully, together with duration of isolation, condition as to desquamation, mucous or purulent discharges, presence of infecting bacteria and the interval before development of the secondary (return) case. How many American hospitals furnish such data, data which are often clearly shown by many English hospitals? Unless great care is used in searching for these recurrences many of them are sure to be missed.

Cross infection in the hospital ought also to be reported in the same careful manner as the above.

Infection of the staff, physicians, nurses and other employees, should be reported with similar detail.

The prevention of tuberculosis is now occupying much of the attention of health officials and has enlisted much private activity. The proper differentiation of public and private effort and the best lines of direction for efficient work are still matters for study and discussion. Every health report should show definitely just what the municipality is doing in the way of notification, following up of cases, nursing supervision, pecuniary assistance, clinics, day camps, fresh air schools, hospitals, sanatoria, publicity and investigation. It would not be much of an addition to the report, and would greatly assist investigation of the subject, if the work of other agencies than the health department along these lines should be referred to briefly.

It is believed by most that the free distribution of antitoxin is necessary for the successful control of diphtheria. Others think that the municipality should provide a physician to administer the antitoxin. If such is done the report should clearly state the amount distributed, the number of persons treated and the number immunized, with the results and cost. Any facts bearing on anaphylaxis should be given. If in any city the municipal distribution of other antitoxin or vaccine is undertaken it should be reported on in the same way.

The question as to the efficiency of terminal disinfection is attracting much attention, as is also the question of the utility of such disinfection. The methods in use should be described. If tests of efficiency are made they should be given in detail. The cost of the service should be given in the financial statement. If the official disinfection consists in part in cleansing, such as washing floor, woodwork and furniture, is should be so stated, and it would be desirable to separate the cost of this from the usual routine gaseous disinfection. So, too, the fact, and cost if possible, of steam disinfection should be noted. If anything is done to secure the direct disinfection of typhoid excreta, or if disinfection is done to destroy malarial or yellow fever mosquitoes, or plague vermin, such should be noted and the cost given, separately, if possible. As many believe that the ordinary routine terminal alleged disinfection by formaldehyde is not efficient, and others think that it is not necessary, it seems wise to set down in black and white just what this procedure costs. The number of tenements disinfected for each disease should certainly be given. Some reports give besides this the number of rooms "fumigated," the number of pieces of goods steamed, and the quantity of the different materials used. In order to study the value of terminal disinfection it is desirable that the recurrences of disease after the termination of isolation should be noted. Unless the recurrences are carefully sought for they are likely to be overlooked, and data, unless accurate, are worthless. The interval between the beginning of the disease and the termination of isolation and the recurrence should be given in the report. It should also be stated clearly whether the recurrence is in the family or in another tenement in the dwelling.

E. As regards the prevention of infant mortality conditions are much the same as with the prevention of tuberculosis. It is new work, requires new methods and enlists private as well as public effort. The relative amount of work carried on by public and private agencies varies in different cities. The report should set forth what is being done and by what agency. Details should be given in regard to publicity, distribution of literature, visiting nurses or physicians, day camps, milk stations, baby clinics, talks to mothers, instruction of "little mothers," etc. It is desirable that the cost of these various activities be separated as much as possible. To assist in determining the value of these methods a good table of infant mortality should be presented giving the causes of deaths by age periods, and the deaths by months. The classification numbers used in Table V indicate the diseases which the committee believed ought to be specified. There is no objection to specifying every disease which causes death under one year. In any event it will usually be necessary to continue this table on a second page and to space the lines so that they may be easily followed. It is very desirable that there should be another table giving the deaths under one year and the rate per 1,000 births for each year for at least ten years. This, however, is not prescribed as essential, as is the other table.

F. The reports of school inspection have been properly criticised as often being prepared in a careless and unscientific manner. As was before said, the report should definitely state whether it is for the school year or the calendar year. The former is more convenient for tabulating and is more often used and is, therefore, preferable for purposes of comparison. All the different lines of work should be described, such as general medical inspection, nursing, and special inspection, as by oculists, dentists, neurologists, etc. Methods for securing treatment for conditions found should be described and results given. Tables showing the work of physicians and nurses are necessary and models for such are here given. Of course they can be greatly extended and others added at the pleasure of local officials. The number of schools in the community should be given and the number of pupils, also the number of physicians, nurses, etc. employed and their salaries.

In tabulating the work of physicians and nurses it is extremely important to distinguish between the *number of examinations* and the *number of pupils examined* and also between the *number of defects* and the *number of defective children*. There is often the greatest confusion in reports as to this, and in every table, and in every other place where figures are used, care should be taken to specify just what is intended. Care should be taken in the use of the words "defect" or "defective children." It is easy to mislead the public by using such terms in connection with such comparatively minor matters as pediculosis and general dirtiness. The proportion of "defective children" can thus be swelled to alarming figures.

H. Probably privy vaults are the nuisances most dangerous to public health. The report should show how numerous they are and what steps have been taken or are being taken for their removal. If action has been taken to render them fly proof, the methods and results should be reported The construction recommended for vaults and privies should be described and the result of attempting to secure such construction should be given. A tabular statement should be given of the number of nuisance inspections made, of the number of formal orders issued and the legal action taken and its results.

Any interesting work in the abatement of important and unusual nuisances such as offensive trades, burning dumps, or stagnant water should be reported. If troublesome problems, such as are presented by the sanitary control of alleys, garbage receptacles, stable manure or chicken-killing establishments, have been partially solved, a statement should be given of what has been done.

I. Great difficulty is usually encountered in attempting to obtain from health reports accurate information in regard to the collection and disposal of municipal wastes and the cost of the same. It is true that in many cities, perhaps in most, waste collection is not a function of the health department, but in many it is and whenever this is the case citizens and others are entitled to all the facts.

In the first place terms should be made clear. It should be noted whether the term garbage is restricted to kitchen refuse or whether market and store refuse is included. If private collectors (licensed scavengers) collect any considerable amount, it should also be stated. If garbage includes combustible refuse as it does in some cities, or ashes and combustible refuse as in other cities, it should be so stated. It should appear whether the collection is by the municipality or by contract, and if possible the number of wagons, horses and men employed should be given. The amount collected should be given either in cubic yards or tons, the latter preferably. The amount should, if other data are available, *never be given in terms of loads.* In giving the cost, the cost of collection and the cost of disposal should be given separately. Information should be given as to frequency and times of collection, the location of receptacles and length of haul, as all this very decidedly affects the expense. If there is a contract it is well to note with whom it is made and how long it has to run.

If ashes or combustible refuse are collected separately from garbage the facts should be presented with the same detail as to amounts, wagons, men, horses and place of collection, length of haul, contract, etc.

The method of disposal of the different kinds of refuse should be well described, whether by sale (and if so the ultimate disposal), by dumping, by towing to sea, by rendering or by cremating, etc. If cremation or rendering is employed the particular process should, at the time of its introduction, be described in detail and the reference to the description given in succeeding reports.

P. Vital statistics are at once the foundation of sanitary science and the test of sanitary practice. While it is not necessary for small communities to make a detailed study of the data, every town which publishes a health report should present a table of the causes of death for the year of the report, by ages and sex. This is absolutely essential. It is also essential that this table should be comparable with similar tables in other reports. This fundamental table (Table XIII) as here presented is approved by the officials of the Census Bureau. It is almost as important that the total deaths, the population and the death rate, be given for a series of years. The committee, therefore, recommend as essential Table XII.

Many other tables giving births and deaths by wards, by months, by nativities, parent nativities, etc., would be of undoubted value wherever a more detailed tabulation and analysis is possible, and especially in the larger cities. And for all such cities it is recommended that to the two tables above required, Tables XIV, XV, and XVI be added.

Here in the United States most interesting conditions exist. Many nationalities dwell in the same city and oftentimes in the same ward, yet have different habits of living. Wonderful opportunities are thus afforded for comparing the various peoples, and for learning the dangers peculiar to each. Tables XIV, XV, and XVI, based upon a division of the population by birthplaces of mothers, will permit such comparison of different nationalities in the same city and of each nationality in different cities.

In the tables of deaths must be included every death occurring in the town or city represented by the table. No exception must be made on any pretext whatsoever. If, however, it is desired to show in a separate table, or paragraph, deaths of non-residents, or deaths in institutions, or the deaths in any other special class, there is no objection, but all such must in every instance be included in the tables recommended by this committee. Stillbirths are not to be included in tables of deaths but the death of every child born alive, whether premature or not, even if it lives only a fraction of a minute, must be included.

In communities in which the colored population is considerable, Table XIII may be repeated so as to show all the facts for the whites in one table and for the colored population in another table or the white and colored may be shown under each disease on separate lines below the males and females.

Tables of births must include living births only. Stillbirths are to be omitted.

Annual reports should always contain in their tables all the deaths and births *occurring* during the year, not those *reported* during the year.

Always state whether the population figures are from a census, municipal, state or federal, or estimated. If estimated the estimate should *invariably* be by the arithmetical method as follows: The difference between the last two censuses should be divided by the number of years between the censuses and the quotient added to the last census figures each year until another census is available. For example, the interval of $4\frac{23}{24}$ years between the Massachusetts State Census May 1, 1905, and the Federal Census April 15, 1910, necessitates adding to the last census population of a Massachusetts city, in order to get the July 1, 1913 estimate, the result of the following:

$$\frac{\text{1910 Pop.} - \text{1905 Pop.}}{4\frac{23}{24}} \times 3\frac{5}{24}.$$

If, however, an addition is made by annexation, the population of the annexed territory should be added at the time of annexation and the number and date should be given in a footnote.

TABLE I.

FINANCIAL STATEMENT.

Receipts.	1911.	1912.
Appropriations.		
Other Receipts.		
Total.		
Expenditures.		
General Administration.		
Salaries, executive officers.		
Salaries, executive clerks.		
Publishing annual report.		
Other printing than above.		
Other binding than above.		
Additions to library.		
Office supplies.		
Telephones and telegrams.		
Postage.		
Rent, water, heat, etc.		
Other expenses.		
Registration of Births, Marriages and Deaths.		
Laboratory.		
Science and Education.		
a. Research.		
b. Publicity and education.		
Prevention of Communicable Diseases.		
Hospitalization.		
Maintenance of hospital.		
Payments to other towns.		
Prevention of tuberculosis.		
Control of outbreaks of smallpox, etc.		
Supervision of cases.		
Visiting nurses.		
Vaccination.		
Antitoxin and its administration.		
Payments for loss of wages.		
Disinfection.		
Maritime quarantine.		
Other expenses.		
Pest Extermination.		
Flies.		
Mosquitoes.		
Rodents.		
Prevention of Infant Mortality.		
Protection of Child Life.		
School physicians.		
School nurses.		
Dental inspection.		
Other school inspection expenses.		
Other expenses for the protection of child life.		
Food Protection.		
Milk and dairy protection.		
Prevention of food and drug adulteration.		
Inspection of meat and groceries.		
Inspection of slaughter houses.		
Inspection of bakeries.		
Inspection of restaurants and hotels.		
Other food inspection.		
Other Direct Health Protection.		
Refuse Removal.		
Garbage.		
Collection.		
Disposal.		
Ashes.		
Collection.		
Disposal.		
Combustible waste.		
Collection.		
Disposal.		
Dead animals.		
Night soil.		
Nuisance Prevention.		
Smoke Prevention.		
Inspection for Protection of Persons and Property.		
Tenement houses.		
Lodging houses.		
Plumbing.		
Other inspection.		
Other Expenses of Department.		

TABLE II.

CASES AND DEATHS OF DISEASES DANGEROUS TO THE PUBLIC HEALTH BY MONTHS.

This table includes ALL cases (with their deaths) irrespective of whether cases were transported into the city from elsewhere or were contracted outside of the city.

Months.	Diphtheria.		Scarlet Fever.		Typhoid Fever.		Measles.		Whooping Cough.		Smallpox.		Ophthalmia Neonatorum.		Poliomyelitis.		Tuberculosis.						Total for Month.	
																	Pulmonary and Miliary.		Meningeal.		Other forms.			
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
January.																								
February.																								
March.																								
April.																								
May.																								
June.																								
July.																								
August.																								
September.																								
October.																								
November.																								
December.																								
Totals.																								

TABLE III.

CASES AND DEATHS OF CERTAIN DISEASES. EACH YEAR FOR TEN YEARS.

This table includes ALL cases (with their deaths) irrespective of whether the cases were transported into the city from elsewhere or were contracted outside of the city.

Years.	Diphtheria.		Scarlet Fever.		Typhoid Fever.		Measles.		Whooping Cough.		Smallpox.		Ophthalmia Neonatorum.		Poliomyelitis.		Tuberculosis.					
																	Pulmonary and Miliary.		Meningeal.		Other Forms.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1903																						
1904																						
1905																						
1906																						
1907																						
1908																						
1909																						
1910																						
1911																						
1912																						

The above listed diseases are among the more prevalent which are required to be reported by the State Board of Health in Massachusetts. In other places a somewhat different list may be more useful.

Each of these tables might well be spread over the greater part of page.

TABLE IV.

REMOVAL OF CASES TO HOSPITAL FOR CONTAGIOUS DISEASES.

Year.	Scarlet Fever.		Diphtheria.		When numbers warrant, specify other diseases or combinations of diseases.	Other Diseases.	
	Cases Removed	Deaths.	Cases Removed.	Deaths.		Cases Removed.	Deaths.
1903							
1904							
1905							
1906							
1907							
1908							
1909							
1910							
1911							
1912							
Totals							

TABLE V.

INFANT MORTALITY.

Year 19.....	Ages.												
	Total deaths under 1 year.	Under 1 day.	1–2 days.	2–3 days.	3 days—1 week.	1–2 weeks.	2–3 weeks.	3 weeks—1 month.	1–2 months.	2–3 months.	3–6 months.	6–9 months.	9–12 months.
January													
February													
March													
April													
May													
June													
July													
August													
September													
October													
November													
December													
Male													
Female													
White													
Colored													
Classification Number.													
1													
5													
6													
7													
8													
9													
10 (The titles corresponding to these numbers are to be inserted here.)													
14													
18													
19													
20													
24													
28													
29													
30													
31–35													
36													
37													
38													
61													
61a													
63a													
71													
76													
79													
89													
91													
92													
93													
103													
104													
108													
109													
117													
119													
143													
144													
145													
150a													
b													
c													
151a													
b													
152a													
b													
167													
168													
172													
182–184													
187–189													
Other causes													
Totals													

TABLE VI.

SCHOOL PHYSICIAN'S REPORT.

Diseases.	Cases.*	Result.	
		Improved.	Not improved.
Diphtheria			
Scarlet fever			
Measles			
Tonsilitis			
Tuberculosis			
Other contagious diseases			
Suspected contagious disease			
Anæmia			
Diseases of the digestive system			
Diseases of the ear			
Defects of hearing			
Diseases of the eye			
Defects of vision			
Diseases of the circulatory system			
Diseases of the nervous system			
Diseases of the respiratory system			
Pediculosis			
Scabies			
Other diseases of the skin			
Defective teeth			
Orthopedic cases			
Tonsils and adenoids			
Totals			

Vaccinations..
Number of pupils examined..................................
Number referred to family physician............................
Number sent to hospital or dispensary..........................

---

*Refers to number of diseases, not to number of children. Several diseases may be found in one child.

TABLE VII.

SCHOOL NURSE'S REPORT.

Diseases.	Cases.*	Result.	
		Improved.	Not improved.
Defective teeth			
Defective vision			
Other diseases of the eye			
Defective hearing			
Other diseases of the ear			
Diseases of the digestive system			
Diseases of the circulatory system			
Diseases of the nervous system			
Diseases of the respiratory system			
Impetigo contagiosa			
Ringworm			
Pediculosis			
Scabies			
Other diseases of skin			
Orthopedic cases.			
First aid			
Wounds			
Totals			

Number of children examined..................................
Number referred to school physician.............................
Number taken to hospital or dispensary.........................
Number treated at home......................................
Number of home visits...

Make it evident whether "Number of children examined" refers to number of individuals examined or number of examinations made.

*Refers to number of diseases, not to number of children, several diseases may be found in one child.

TABLE VIII.

MILK INSPECTION—GENERAL STATISTICS.

	1908.	1909.	1910.	1911.	1912.
MILK INSPECTION—CITY.					
Samples, milk and cream for chemical analysis					
No. found below grade					
Percent below grade					
Samples, milk and cream for bacteriological analysis					
No. above 500,000 bacteria per cc.					
Percent above 500,000 bacteria per cc.					
Temperatures of milk and cream taken					
No. found above 50° Fahrenheit					
Percent above 50° Fahrenheit					
INSPECTIONS.					
No. of depots and stores handling milk					
No. of inspections made					
No. of re-inspections made					
No. found contrary to regulations					
No. of inspections of wagons					
Average no. of inspections per store					
LICENSES.					
No. of Licenses for depots issued					
No. of Licenses for stores					
No. of Licenses for wagons					
No. of Licenses refused					
No. of Licenses revoked					
MILK INSPECTION—COUNTRY.					
No. of farms supplying milk and cream					
No. of farm inspections (not scored)					
No. of farm inspections (scored)					
No. of re-inspections (not scored)					
No. of re-inspections (scored)					
Total inspections of all kinds					
Average no. of inspections per farm					
Average score of farms					
Contagious disease investigation					
LEGAL CASES.					
Suits instituted.					
Convictions					
Pending					
Fines imposed					
MISCELLANEOUS MILK DATA.					
Total daily supply, gals.					
Per cent. of milk pasteurized					
Average price of milk, winter					
Average price of milk, summer					
Letters or orders sent					

If some of the information called for in this table is not available, the items that cannot be filled are to be omitted.

TABLE IX.

CLASSIFICATION OF DAIRY FARMS INSPECTED DURING FIVE YEARS ACCORDING TO SCORES.

	1907.		1908.		1909.		1910.		1911.	
	No.	%.	No.	%.	No.	%.	No.	%.	No.	%.
Scoring below 31										
Scoring 31 to 40										
Scoring 41 to 50										
Scoring 51 to 60										
Scoring 61 to 70										
Scoring 71 to 80										
Scoring 81 to 90										
Scoring 91 to 100										
Total No. of Dairies Inspected										
Average Score All Dairies										

TABLE X.

RESULTS OF BACTERIOLOGICAL EXAMINATIONS OF MILK (YEAR).

Bacteria per cubic centimeter.	Samples from wagons.		Samples from stores.		Samples from depots.	
	No.	%.	No.	%.	No.	%.
Below 10,000						
10,000 to 20,000						
20,000 to 50,000						
50,000 to 100,000						
100,000 to 500,000						
Total samples under 500,000						
500,000 to 1,000,000						
1,000,000 to 5,000,000						
5,000,000 to 10,000,000						
Above 10,000,000						
Total samples above 500,000						
Grand total of samples						

TABLE XI.

NUMBER OF {TONS / CU. YARDS} OF GARBAGE, ASHES AND COMBUSTIBLE WASTE COLLECTED, WITH COST OF COLLECTION AND DISPOSAL OF EACH.

GARBAGE.

Total Amount, Tons or Cu. Yards.	Method of * Disposal.	Receipts.	Cost of Collection.	Cost of Disposal.	Net Cost of Both.

ASHES.

Total Amount, Tons or Cu. Yards.	Method of * Disposal.	Receipts.	Cost of Collection.	Cost of Disposal.	Net Cost of Both.

COMBUSTIBLE WASTE.

Total Amount, Tons or Cu. Yards.	Method of * Disposal.	Receipts.	Cost of Collection.	Cost of Disposal.	Net Cost of Both.

Give all amounts in tons or cubic yards, not in loads.

*State method of disposal, whether by feeding to swine, burning, dumping, etc. If more than one method of disposal, so state, giving amounts of each.

TABLE XII.

BIRTHS, DEATHS, STILLBIRTHS AND PERSONS MARRIED, WITH POPULATION AND RATES PER 1,000 OF POPULATION.

Year.	Population.* Estimated July 1st.	Births (Stillbirths excluded).	Deaths (Stillbirths excluded).	Stillbirths.	Persons Married.	Rates per 1,000 of Population.		
						Birth Rate.	Death Rate.	Persons Married. Rate.
1903.								
1904.								
1905.								
1906.								
1907.								
1908.								
1909.								
1910.								
1911.								
1912.								

* Census populations were in 1900..............................
1905..............................
1910..............................

July 1st populations estimated by the arithmetical method as described on page 614.

This table might well be spread over a larger part of the page.

TABLE XIII.

DEATHS CLASSIFIED BY SEX,

EXCLUSIVE

Class. No.	Cause of Death.	All Ages.	Under 1 year.	1.	2.	3.	4.	5–9.	10–14.	15–19.	20–24.
	All causes. Total Male Female										
1.	Typhoid Fever	125 M.75 F. 50									
6.	Measles (etc.)	4 M.2 F. 2									
	(Causes which show no deaths for the year may be omitted.)										

TABLE XIII.—*Continued.*

BY AGE AND BY CAUSE.

OF STILLBIRTHS.

25–29.	30–34.	35–39.	40–44.	45–49.	50–54.	55–59.	60–64.	65–69.	70–74.	75–79.	80–84.	85–89.	90–94.	95–99.	100 +	Unk	Class. No.
																	} 1.
																	} 6.

TABLE XIV.

POPULATION ACCORDING TO 1910 CENSUS, BY SEX, BY

			All ages.	Under 1 year.	1.	2.	3.	4.	5–9.	10–14.	15–19.	20–24.
1	Total											
	Males											
	Females											
2	White Total											
	Males											
	Females											
3	Colored Total											
	Males											
	Females											
	For whites only. Mothers born in											
4	United States	M										
		F										
5	Ireland	M										
		F										
6	Germany	M										
		F										
7	England & Wales	M										
		F										
8	Canada	M										
		F										
9	Scandinavia	M										
		F										
10	Scotland	M										
		F										
11	Italy	M										
		F										
12	France	M										
		F										
13	Hungary	M										
		F										
14	Bohemia	M										
		F										
15	Russia	M										
		F										
16	Poland	M										
		F										
17	Other Foreign	M										
		F										
18	Unknown	M										
		F										

TABLE XIV.—*Continued.*

AGE, BY COLOR AND FOR WHITES BY BIRTHPLACE OF MOTHER.

25–29.	30–34.	35–39.	40–44.	45–49.	50–54.	55–59.	60–64.	65–69.	70–74.	75–79.	80–84.	85–89.	90–94.	95–99.	100 +	Unk	
																	1
																	2
																	3
																	4
																	5
																	6
																	7
																	8
																	9
																	10
																	11
																	12
																	13
																	14
																	15
																	16
																	17
																	18

TABLE XV.

DEATHS CLASSIFIED BY CAUSE, BY SEX, BY COLOR,

EXCLUSIVE

Abridged List. Class No.	Abridged list. Causes of Death.		Total.	Whites.	Colored.	For whites Birthplaces of									
						United States.	Ireland.	Germany.	England and Wales.	Canada.	Scandinavia.	Scotland.	Italy.	France.	Hungary.
	All Causes	Total													
		Males													
		Females													
1	Typhoid fever	M													
		F													

TABLE XV.—*Continued.*

BY MONTH AND FOR WHITES BY BIRTHPLACE OF MOTHER.

OF STILLBIRTHS

only. Mothers.																	
Bohemia.	Russia.	Poland.	Other Foreign.	Unknown.	January.	February.	March.	April	May.	June.	July.	August.	September.	October.	November.	December.	Abridged list. Class No.

TABLE XVI.

DEATHS CLASSIFIED BY SEX, BY AGE, BY COLOR, AND EXCLUSIVE

			All ages.	Under 1 year.	1.	2.	3.	4.	5–9.	10–14.	15–19.	20–24.
1	Total											
	Males											
	Females											
2	White	Total										
		Males										
		Females										
3	Colored	Total										
		Males										
		Females										
	For whites only. Mother born in											
4	United States	M										
		F										
5	Ireland	M										
		F										
6	Germany	M										
		F										
7	England & Wales	M										
		F										
8	Canada	M										
		F										
9	Scandinavia	M										
		F										
10	Scotland	M										
		F										
11	Italy	M										
		F										
12	France	M										
		F										
13	Hungary	M										
		F										
14	Bohemia	M										
		F										
15	Russia	M										
		F										
16	Poland	M										
		F										
17	Other Foreign	M										
		F										
18	Unknown	M										
		F										

TABLE XVI.—*Continued.*

FOR WHITES BY BIRTHPLACE OF MOTHER.

OF STILLBIRTHS

25–29.	30–34.	35–39.	40–44.	45–49.	50–54.	55–59.	60–64.	65–69.	70–74.	75–79.	80–84.	85–89.	90–94.	95–99.	100 +	Unk	
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BOOK REVIEWS

The Sources and Modes of Infection. *By Charles V. Chapin, M. D., Sc. D., Superintendent of Health, Providence, R. I., author of "Municipal Sanitation in the United States." Second edition revised and enlarged. Small 8vo., xi, 481 p. $3.00 net (12/6 net). New York: John Wiley & Sons. London: Chapman & Hall, limited, 1912.*

When the first edition of Doctor Chapin's "Sources and Modes of Infection" appeared three years ago its conclusions seemed a little radical to many practical workers in the field of public health. Gradually, however, the wealth of evidence presented has carried conviction to the most skeptical and the wide influence exerted by the work is indicated by the fact that a new edition has been called for in a little over two years. Doctor Chapin's book is so familiar to us all that it seems only necessary to call attention to the specific additions which have been made to the first edition. In the aggregate they are considerable, involving the addition of 80 pages, an increase of 20 per cent. in the size of the book.

In Chapter I, on the Life of Disease Germs Outside of the Body, there are only minor changes, including reference to the demonstration by Ruediger and Houston, that typhoid germs live longer in cold than in warm waters and to the work of Gorham and Pease on the hibernation of oysters and their probable freedom from infection in the winter months. Chapter II, on Carriers and Missed Cases, includes the largest amount of new material, being half again as long as in the old edition. In connection with typhoid fever are noted the newer facts as to the persistence of typhoid bacilli in the gall bladder with consequent intermittent discharge, the data in regard to the percentage of temporary and chronic carriers and carriers among a normal population, the facts which have accumulated as to the length of persistence of carrier infection and the many striking epidemics due to carriers which have been worked out in Washington and New York and in New England. Recent English and German data in regard to the spread of paratyphoid fever by carriers are cited, with French and German data in regard to the distribution of cholera in a similar way. The work of Wickman, Flexner and others in poliomyelitis, which adds a new disease to the list of those probably spread by carriers, is discussed and the chapter ends with a new and admirable summary of the whole carrier problem.

Chapters III (Limitations to the Value of Isolation) and IV (Infection by Contact) are practically unchanged. Chapter V (Infection by Fomites) includes new facts which have accumulated in support of Doctor Chapin's position that ordinary room disinfection is of little sanitary value. Disinfection has now been abandoned in Providence after scarlet fever as well as after measles and the ratio of secondary cases for six years with disinfection was 1.52 and for four years without was 1.61. Comparative figures for diphtheria show in Providence, without disinfection, a ratio of recurrences of 1.64 and in Baltimore, with disinfection, a ratio of 1.76. A new paragraph is added on school disinfection emphasizing the dictum of Hope that "all evidence points strongly to the fact that when children contract infectious disease in school the channel of infection is not by means of school desk or floor but by the personal infection of another child." This word of caution is particularly needed in view of the active campaign being carried on by certain disinfectant firms for there can be no doubt that money now spent on school disinfection could far better be applied to increasing the efficiency of medical inspection.

Chapter VI (Infection by Air) includes a new paragraph on the possible spread of poliomyelitis by dust and a reference to the work of the reviewer on streptococci in dust. It should be noted that in the final report on this subject by Kligler and the reviewer which has appeared since Doctor Chapin's book it was pointed out that "it should be understood that these results lend any weight to the theory of what is ordinarily conceived as the aërial transmission of disease." Disease germs may, perhaps, be carried by "dust inhaled or ingested in considerable quantities," as it is by the mouth spray, but in both cases the pollution is a local and transient one. The experience of modern hospitals of which much that is new is cited by Doctor Chapin, and recent bacteriological studies of school room air in New York have shown that ordinary quiet air must be a wholly insignificant factor in the spread of disease.

Chapter VII (Infection by Food and Drink) contains new paragraphs on water-borne dysentery in our western states and on McLaughlin's study of water-borne diarrhoea, on Hill's damaging criticism of the typhoid epidemic at Ogdensburg, attributed on very dubious evidence to ice and on the recent American milk epidemics of septic sore throat. The most important new material, however, is the analysis of the Mills-Reincke theorum in regard to the part played by improved water in decreasing disease other than typhoid fever. Doctor Chapin points out the great uncertainty involved in deductions from a decrease in the general death rate from all causes and notes that the decreases in deaths from the special causes specifically mentioned by Sedgwick and MacNutt in their study of this subject are not concordant in the various cities cited. Infant diarrhoea decreased more rapidly after filtration in Hamburg and Lowell but not in Albany and Lawrence. Tuberculosis declined no more rapidly in Lawrence and Lowell and Albany after water purification than before. There was a drop in pneumonia in Lawrence but not in Lowell. More recent evidence from Providence, Cinncinati, Columbus, Pittsburgh, and Philadelphia does not tend to bear out the Mills-Reincke theory except in regard to diarrhoea at Pittsburgh. Doctor Chapin concludes, " at present it seems unwise to consider the proposition demonstrated and to promise a lowering of the general death rate as a result of the purification of water supplies."

Chapter VIII (Infection by Insects) contains a great deal of new material. The suggested relation between pellagra and Simulium, opilacao and Connorrhinus, pappataci fever and oriental sore, and sand flies is briefly discussed and several pages are devoted to the important and fairly conclusive demonstration that typhus fever is spread by the body louse, which so well explains the historical and geographical and seasonal prevalence of this disease. The main additions of this chapter are, however, in the section dealing with the house fly. The impression that this insect may play an important part in spreading disease has been materially strengthened during the last two years by bacteriological studies leading to the isolation of disease germs from the bodies of flies, by English studies of the seasonal coincidence of flies with diarrhoea, by Doctor Hill's studies of fly-borne typhoid in Minnesota, and particularly by the reduction in typhoid fever following anti-fly campaigns in Jacksonville, Richmond and Asheville. Doctor Chapin still preserves a considerable skepticism in regard to this question, a skepticism which seems not quite warranted so far as the conditions in southern cities and in rural districts are concerned. His final summing up, however, which is word for word the same as that in the first edition is still wholly in accord with facts: " It is probable that under certain conditions, as in military and civil camps and in filthy communities without sewerage, insects, especially flies, may be an important factor in the spread of the fecal-borne diseases, but there is no evidence that in a well-sewered city with few privies the house fly is a factor of great moment in the dissemination of disease."

There could, indeed, be no better evidence of Doctor Chapin's soundness and caution than the fact that not one of the general conclusions in the first edition of this work have yet required important modification in the light of subsequent experience. The Sources and Modes of Infection will continue to serve as a safe chart and compass for the scientific and progressive sanitarian.

C.-E. A. Winslow.

The Modern Treatment of Nervous and Mental Diseases. *By eminent American and British authors. Edited by William A. White, M.D., Superintendent of the Government Hospital for the Insane, Washington, D. C.; Professor of Nervous and Mental Diseases in the Georgetown University and in the George Washington University; Lecturer on Mental Diseases in the U. S. Army and U. S. Navy Medical School, Washington, D. C., and Smith Ely Jelliffe, A.M., M.D., Ph.D., Adjunct Professor of Diseases of the Mind and Nervous System in the Post-Graduate Medical School and Hospital; Visiting Neurologist to the City Hospital; Consulting Neurologist to the Manhattan State Hospital, New York, N. Y. Two octavo volumes, containing about 900 pages each, illustrated. Per volume, cloth, $6.00 net. Lea & Febiger, Publishers, Philadelphia and New York, 1913.*

This exceedingly interesting and important work brings together the views of not only the sociologist, pedagogist and criminologist, but also the neurologist and psychiatrist. Of special interest to health officers, and particularly medical officers of schools, are the chapters upon education, feeble-mindedness and mental hygiene.

The chapter on education by Doctor Colvin illustrates clearly the development of fundamental instincts and recognizes their close relation to learning and education, demonstrating the factors that are lacking in feeble-minded and retarded children. He refers to conduct and behavior as the fundamental factors upon which the child's future is based.

Doctor Goddard, in the chapter on educational treatment of the feeble-minded, furnished, in a concise and excellent manner, the meaning and causes of feeble-mindedness and follows the same by a complete outline of the Binet-Simon measuring scale of intelligence. Under the principles of training he includes memory, reproductive and constructive imagination. He refers also to the necessity of "doing things" with an incentive. Activities must be pleasant from the beginning, hence frequency of change and the bringing in new interests must be associated with the correction of faulty mental habits.

The chapter on delinquency and crime by Doctor Healy refers briefly to the fundamental causations of criminality and also to the many conditions under which the child may become a public charge. He recommends well-adapted stimuli and the creation of new interests in dealing with the rationale of treatment in the juvenile offender. The right companion at the right time, the correct explanation of bothersome thoughts, and the development of healthy mental trends are definite guides to success.

Doctor Salmon, writing upon immigration and the prevention of mental diseases concludes by saying that the pressing need is not for better immigration laws or for facilities for enforcing them, but a sufficient number of medical officers trained in psychiatry, for sufficient interpreters and for adequate and sanitary detention quarters in all parts.

The remaining chapters are devoted to interesting expositions upon treatment of the various types of psychoses.

The work is a very valuable one and the latest and best on the subject.

Frederic J. Farnell, M.D.,
Providence, Rhode Island.

The New York Charities Directory. *Published by the Charity Organization Society of the city of New York. United Charities Building, 105 East 22d Street, New York. 865 pp. octavo, cloth bound, $1.00.*

The twenty-second (1913) edition of the New York Charities Directory which has just been published is an indispensable guide and reference book to any one engaged or interested in social, civic, religious and charity work. The presence of this book on one's desk will be found of great value. The vast amount of material contained in the Directory is well organized and classified. The information is presented under the headings of the following nine classes: Class I, Care and Relief of the Needy in Their Homes; Class II, Relief for Destitute, Neglected and Delinquent Children; Class III, Relief in Permanent and Temporary Homes for Adults; Class IV, Relief for the Sick; Class V, Tuberculosis Prevention and Relief; Class VI, Relief for the Defective; Class VII, Treatment of Delinquent Adults; Class VIII, Preventive Social Work; Class IX, Supervisory and Educational Work.

There is an index by names and also by organizations. A most useful book!

HEALTH DEPARTMENT REPORTS AND NOTES.

TO STATE AND MUNICIPAL HEALTH OFFICERS.

This new division of the Journal is specially designed to be of use to active Health Officers of the countries represented in the American Public Health Association. It will be unable to serve its true function unless the Health Officers are willing to coöperate by sending to the Journal copies of their reports, bulletins, new ordinances and personal information which will be of general interest. Furthermore it would be distinctly desirable if communications on subjects of general interest are submitted for publication in this division of the Journal. The management will further welcome any suggestions from Health Officers for the improvement of this division. All communications should be addressed to Selskar M. Gunn, Managing Editor, American Journal of Public Health, 755 Boylston St., Boston, Mass.

REPORTS.

Seattle, Washington.

Doctor J. E. Crichton, the Commissioner of Health, presents an interesting report for 1911. He states that the year 1911 has proven to be one of the most successful years in health work.

A full discussion of the death rate of Seattle is given which leads Doctor Crichton to the conclusion "that the city of Seattle was not only the most healthful city in the United States in 1910, but was the most healthful city in the entire world." The population of Seattle in 1910 was 237,194. The death rate for 1911 was 8.87 per 1,000. The deaths under one year per 1,000 births was 79.

An interesting and serious situation arose in November 1911 when the great conduits, which bring the water supply to the city were swept away by a severe flood leaving only 100 million gallons of water in the reservoirs which was quickly used up. This made it necessary for the city to pump water into the mains "from sources absolutely dangerous." The department quickly devised methods of rendering the water safe, by black headline articles in the papers several days before the water was turned on, which advised the people to boil the water. Packages of chloride of lime were also sent to the dairy men using this water with instructions for its application so that the water would be safe to use in washing cans, pails, etc. Sixty thousand circulars were distributed in the homes of the people, advising them to boil the water or use chloride of lime. Finally when the break in the conducts was repaired and the regular supply turned on again the entire system of mains was flushed out by the Water Department. No Typhoid Fever followed this water famine. Doctor Crichton points out that that which assisted the Health Department more than all other factors combined was the fact that the people seemed to believe in the department and to realize that nothing was being covered up. The circular which was distributed was written in a very vigorous style and headed "DANGER" "Water throughout the City is Filled with Disease Bearing Germs."

The garbage collection problem is discussed. At the time of the report the garbage situation had resolved itself into a semi-municipal collection and complete municipal destruction and disposal. The term "garbage" in Seattle is used to include all wastes and during 1911 about 250 tons were collected daily. Space forbids reference to the interesting section dealing with the Tuberculosis situation.

Many valuable tables are given and the statistics are satisfactory. Tuberculosis caused 301 deaths. Diarrhoea and Enteritis under two years, 55, Typhoid Fever 24, Diphtheria 20, and Scarlet Fever 8.

Jacksonville, Florida.

Doctor C. E. Terry, the Health Officer, adds another excellent report for the Health Department of the City of Jacksonville for 1912. Doctor Terry states that "it is probably quite true that no municipal report involving a record of as much labor and responsibility as that of a health department receives less attention at the hands of those for whom it is intended and whom it most nearly concerns, the citizens, and I cannot but feel that until the average man and woman come to realize that a low death rate is a greater economy than a low tax rate, a community will reap its full measure of reward for efforts directed at health conservation."

The population for 1912 was estimated at 70,194. The crude death rate was 18.1 and the resident death rate 14.8. There was a decrease of 3.3 per 1,000 in the crude rate over 1911 giving the lowest death rate ever recorded for the city.

Two hundred and fifty-one cases of Smallpox were reported and no deaths. Wholesale vaccination was carried out which was followed by a sudden drop in the number of cases reported. Approximately 30,000 people were vaccinated. Doctor Terry's admirable work on Typhoid Fever has been continued. "1911 showed a decrease of 35 per cent over the preceding year in mortality from this cause and the past year shows a still greater reduction of 55 per cent less than last year." There were 18 deaths from Typhoid Fever in 1912 as against 40 for 1911, and 62 for 1910. Doctor Terry states that he feels that the evidence that a large proportion of the Typhoid Fever of Jacksonville was fly borne is now about complete.

Infantile Diarrhoea has been added to the list of reportable diseases. The subject of infant mortality is interestingly discussed.

Those who are interested in the general question of habit-forming drugs will find interesting information on this subject in the report.

The reports of the various inspectors contain much interesting information.

Allentown, Pennsylvania

The President of the Board of Health emphasizes the great importance of the city installing a complete system of house sewerage. He states that it seems incredible that Allentown has escaped the ravages of an outbreak of Typhoid Fever by reason of her neglect in installing house sewerage.

The establishment of a Municipal Hospital for contagious diseases is announced. The Health Officer, Doctor N. C. E. Guth, presents a short report in which he emphasizes the value of placarding houses in which there is a case of Typhoid Fever. One hundred and seventy-three cases of Typhoid Fever with 14 deaths are reported in the city, the population of which is given at 58,000. An alphabetical list of the causes of death is given which is unusually unsatisfactory. The death rate is not given.

The financial statement indicates that the Board of Health expended $16,638.38, this including the collection and disposal of garbage.

DEPARTMENT NOTES.

Ice Cream.

Attention is called to the fact that supervision of the ice cream supply of most communities has been sadly neglected. This has been the case in many communities where a determined effort has been made to improve the milk and cream supply, and also in communities where the regulations of the far less important articles, butter and cheese, has been agitated. When we consider the wide use that is made of ice cream as a food for invalids and children, in addition to the wide use that is made of it as a refreshment, it is hard to account for the neglect of the proper supervision of this article of food, except for the sole reason that sufficient thought has not been given to the subject.

It is generally recognized that a large amount of ice cream is made from milk and cream that are in such a condition that no health board would allow them to be sold as milk and cream. It is also well known that ice cream is usually thickened with starch, gelatin or vegetable jellies, so that it will not soften readily and so that it may be kept for long periods of time, and also so that only a small amount of cream is necessary to give the proper consistency.

Ice cream is oftentimes manufactured in filthy basements, and it usually contains millions of bacteria per cubic centimeter, some of which are often streptococci and gas-producing organisms. The proper color is sometimes obtained by the use of coal-tar dyes.

There are many cases on record in which impure ice cream has caused ptomaine poisoning and intestinal disorders of various kinds. The development of ptomaine poisoning in ice cream is entirely prevented by the use of pure, sanitary raw products, manufacturing the ice cream in perfectly clean surroundings, and disposing of it within a reasonable time after manufacture. The sooner ice cream can be consumed after it is made the better.

The public cannot be expected to take an active interest in the quality of the ice cream that it purchases until a campaign of education is started by the health authorities. The general impression seems to be that as long as the ice cream is frozen all harmful bacteria must be killed, but we know that this is far from being the case.

Boards of Health should aim to secure a supply of ice cream (1) that is manufactured from milk and cream that are of good quality, (2) that is manufactured in clean, light, well ventilated, sanitary establishments and (3) that is free from adulteration, especially of the injurious kind.

The proper regulation of the ice cream supply of any community involves a large amount of inspection work, both of dairies and of manufacturing plants, and a large amount of analytical work. By the adoption of proper plans for publicity work the coöperation of the public can be secured, and a much more rapid improvement in the ice cream supply can be obtained than by the long and costly method of improvement by legal means.

The importance of the ice cream supply of a community as a possible carrier of infection should be recognized, and it is hoped that the suggestions herein advanced may be the means of causing more attention being paid to this matter in the future than in the past.

C. H. Wells, Health Officer, Montclair, N. J.

Is "Bob Veal" Poisonous?

Laws which are in force in various countries, notably in the United States, forbid the sale of veal under one month of age for use as human food. There is a wide-spread belief that bob veal, as the flesh of these very young calves is popularly called, has properties detrimental to health. It is well known that the flesh of younger animals is richer in water and more tender than that of older ones of the same species. The proportion of the nutrient substances increases with age. Older animals, likewise, yield more of the extractive bodies; so that soup prepared from veal is by no means comparable with that yielded by the meat of fattened cattle. Veal is commonly regarded as more difficult of digestion than beef, the reason being assigned to differences in the texture of the flesh.

Prof. P. A. Fish of Cornell University has reported a series of experiments in which bob veal was compared with market veal and with beef in respect to some of its properties. Experiments were also carried on in which bob veal was eaten in seven families aggregating twenty individuals ranging from two to sixty years of age. The health of all cases was apparently normal; nor did any family refuse a second helping when another carcass became available. In all veal there is a deficiency of fat as compared with beef. In bob veal this deficiency is naturally somewhat more pronounced, because fat is a result of growth and age under proper nutritive conditions. In the use of bob veal this deficiency may be overcome to a considerable extent by cooking the veal with pork or other fat. Professor Fish is of the opinion that bob veal is in no way injurious when used as human food. The desirability of changing the present regulations and existing legal restrictions regarding the sale of very young veal is thus thrown open for discussion, says the *Journal of the American Medical Association* for March 15. The subject is one which should not be dismissed or settled by a few haphazard experiments or hasty generalizations.

Fly Campaign in 1913.

"During the latter part of the month we will begin our fifth annual campaign against the house fly. This year not only the schools will join, but the Chamber of Commerce and the Department of Public Works will unite with the citizens in an annual clean-up week, beginning May 26. The Health Bureau will start this campaign a few days earlier by going into as many public and parochial schools as possible with moving pictures of the fly, and for the distribution of small colored pamphlets relating to the fly and its dangers. The preliminary campaign against the fly was begun at the Child Welfare Exhibit, April 5–12, when 10,000 buttons bearing the picture of a fly and the legend—'Rochester, N. Y., No Flies, Dirt, Disease,' and 10,000 certificates were distributed to those children who were willing to promise to stand for the statements in the certificate.

"A number of thousand fly swats were expected to be distributed to each holder of the certificate, but unfortunately the fly swats were held up somewhere between the point of shipment in Ohio and Rochester because of the flood, and were, therefore, not distributed. These fly swats will be distributed to holders of the certificates on presentation of the certificate.

"In all of this work the bureau was assisted by the Consumer's League Committee of the Woman's Union, and further assistance is promised by the Union in the distribution of the fly swats and pamphlets. The Woman's Union have proposed to distribute prizes for flies trapped or swatted. A number of merchants will make window displays of fly traps and swats during the clean-up campaign. A large fly trap, suitable for restaurants, large kitchens, windows of livery stables, is being made by some of the schools. Any bright boy with mechanical turn of mind may see the trap at the Health Bureau and, perhaps, make some of them for sale.

"This campaign is not only for the cleanliness of Rochester, but this year it is undertaken that we may save our people, especially our children, from a fly-borne disease, infantile paralysis, which threatens us. We earnestly hope that everybody will join in this campaign, not only for a cleaner city but for a city which during the summer shall have none, or at least very few, cases of one of the most terrible of diseases, infantile paralysis."

Rochester *Bureau of Health*, April, 1913.

La Grippe.

"Quarantine is seldom made of grippe patients by health authorities and the families of patients usually observe very little or no care to keep the germ of the disease from themselves or any one else; yet la grippe is highly contagious, and causes annually from 10,000 to 12,000 deaths in the United States—in 1907, it caused 20,000. The largest number of deaths occur in the winter months.

"The bacillus of la grippe is found in the sputum, nasal mucus, and in the bronchial secretion, the germ growing in the mouth, throat, trachea, or bronchial tubes. Grippe germs sometimes linger in the nose and bronchial tubes of persons who have had the disease for weeks, months, and even more than than a year; and are spread in the same way that the germs of consumption, diphtheria and pneumonia are spread.

"The grippe germ produces a toxin which poisons the body, and causes weakness and depression, which is not often easy to overcome for months. Many physicians assert that la grippe often brings on pneumonia, ear and eye troubles, etc., and too frequently leaves the kidneys, stomach or nervous system in diseased condition.

"La grippe patients should be isolated.

"The hands of a patient, dishes used, clothes (especially handkerchiefs) should be carefully disinfected.

"Patients should be careful to catch nasal discharge and sputum in handkerchiefs or cloths.

"No food which has been in a patient's room should be eaten by anyone else.

"No la grippe patient should kiss anyone.

"On the patient's recovery the room used should be fumigated."

Monthly Bulletin of the Chattanooga Board of Health.

Finger Bowls.

"The Buffalo Health Department has taken steps to rid the city o' brass finger bowls. A recent investigation showed that such bowls were in use in over half of the restaurants and in some of the hotels. Health Commissioner Fronczack said that the brass bowls were insanitary and spread disease, because it was difficult to cleanse them thoroughly, The Health Commissioner did not object to the use of glass bowls if the waiter rinsed the bowl in boiling water after it had been used. The Health Department is to make war against all restaurants and hotels where sanitary laws are not observed."

American Practitioner, April, 1913.

Venereal Diseases Legislation.

The state of Vermont has recently passed an act with regard to the control of venereal disease, which is here reproduced.

"*An Act to Prevent the Spread of Certain Infectious Diseases.*

"Section 1. Commencing on the date of the passage of this act the superintendent or other officer in charge of public institutions such as hospitals, dispensaries, clinics, homes, asylums, charitable and correctionable institutions, shall report promptly to the state board of health the name, sex, age, nationality, race, marital state and address of every charitable patient under observation suffering from venereal diseases in any form, stating the name, character, stage and duration of the infection, and, if obtainable, the date and source of contracting the same.

"Sect. 2. Physicians shall furnish similar information concerning private patients under their care, except that the name and address of the patient shall not be reported.

"Sect. 3. All information and reports in connection with persons suffering from such diseases shall be regarded as absolutely confidential, and shall not be accessible by the public nor shall such records be deemed public records.

"Sect. 4. The state board of health shall provide at the expense of the state, facilities for the free bacteriological examination of discharges for the diagnosis of gonorrheal infections, and also shall provide, at cost, vaccines or antitoxins for the treatment of such infections. And said board shall make, at the expense of the state, the Wassermann test or examine smears for the diagnosis of syphilis; and shall furnish the treatment known as 'Salvarsan' or other accredited specific treatment at cost. But such diagnosis and treatment shall not be furnished until the data required for the registration of the case has been furnished by the physician or institution treating the patient.

"Sect. 5. The state board of health shall include in bulletins or circulars distributed by it, information concerning the diseases covered by this act.

"Approved, February 3, 1913."

Sterilization.

"There are at present nine states which, by the force of the law, provide for the sterilization of certain criminals and of the feeble-minded. Many other states are preparing laws of this kind. The *Bulletin* hopes to see all of the states in the Union adopt this law.

"The operation of vasectomy itself is practically a painless one, and does not, as most members of the laity believe, deprive the individual of his desire or capacity for sexual congress; it simply prohibits his ability to procreate.

"To many, who have given the matter mere superficial thought, the sentimental point of view is uppermost, but a sane, practical view taken outweighs this.

"Many inmates of institutions for the feeble-minded could be kept safely at their homes and help earn their own and their family's living were it not for the opportunity to reproduce their own kind, which such liberty would give them.

"Viewed from every aspect, it will appear the most practical of any plan for the elimination of the criminal and weak-minded strains, causing an uplifting of the race, and a bettering of the nation."

Texas State Board of Health Bulletin, February, 1913.

Ophthalmia Neonatorum.

"The oft-quoted rough estimate that 25 per cent. of the cases of blindness in public institutions for the blind lost their sight through ophthalmia neonatorum is further substantiated by figures given out by the New York State School for the Blind, at Batavia. Of the 166 pupils registered at this institution during the year ending June, 1912, forty-four lost their sight from ophthalmia neonatorum. This is the more deplorable when one considers that this is a preventable disease. The State Department of Health has for the past few years furnished free for use by physicians and midwives a prophylactic solution which, if dropped into the eyes of the infant immediately after birth, will destroy the virus if there has been infection from the discharges of the mother, and it is to be regretted that owing to a reduced appropriation for this purpose we are unable at the present time to furnish the solution to local health officers, but hope to be able to continue the distribution of the outfits by the first of May, when it is expected that funds appropriated by the present legislature will become available."

Bulletin of New York State Department of Health, March, 1913.

Cattle Poisoning.

"An unusual variety of poisoning occurred in a local dairy last week. Salt is used in large quantities by the dairymen to overcome constipation due to feeding certain foods. In the dairy referred to a fresh shipment of salt was received on Friday and feeding from it started the same evening. On Sunday the first symptoms were noticed; the cows being restless with a staggering gait and showing evidence of pain.

"Paralysis of the fore quarters came on early and at one time twenty-four out of a herd of fifty-two were down at one time. Of these fifteen died.

"Constipation, colicky symptoms, increased respiratory movement, and suppression of urine were noted, death being preceded by coma. At no time was fever noted.

"Nothing developed to indicate an acute infectious disease and an investigation as to the cause of the trouble was started with the food. The change from an old to a new supply of salt thirty-six hours before symptoms developed led to its chemical examination with the result that barium chloride was found to be present in large quantities (about 0.8 per cent.).

"Doctor Woolley examined specimens submitted and reported congestion and pigmentation of the spleen (the pigmentation being due to hemolysis), catarrhal enteritis and acute diffuse nephritis.

"Guinea pigs, inoculated with 1 c.c. of saturated solution of the suspected salt, manifested the same symptoms as the cows. Nothing happened in the control pig injected with 1 c.c. of saturated solution of salt of known purity.

"Barium chloride occurs as an impurity in salt but not often in the quantities found in the above case."

Weekly Report of the Board of Health of Cincinnati, Ohio, May 3, 1913.

"Loose" or "Dipped" Milk in New York.

"In view of recent misunderstandings of the proposed action of the Board of Health in regard to the sale of 'loose' or 'dipped' milk, a résumé of the matter may be of service at this time.

"On September 17, 1912, the following resolution, effective on June 1, 1913, was adopted by the Board of Health:

"'Whereas, The interest of the public health requires that milk should be protected from contamination by human agencies and by dust, dirt and flies, and,

"'Whereas, Many of the premises in the City of New York where milk is sold by dipping from cans are grocery stores in which foods and food products and other commodities not in sealed packages are sold in a manner which causes much dust, and,

"'Whereas, The facilities for proper icing, the proper cleansing of utensils, and the proper protection from flies are often inadequate in such stores, many of which are so arranged that the living rooms open directly into the store, therefore, be it

"'Resolved, That after June 1, 1913, the sale of milk dipped from cans will be permitted only in milk stores approved by this department, and for which a permit has been issued, or in places in which foodstuffs, other than milk products, are sold in original packages only.'

"Subsequently, a draft of special rules and regulations, taking up in detail the requirements of this order, was prepared and sent out by the commissioner to a number of associations and individuals particularly interested in this question, with request for consideration and criticism. It should be noted that these rules and regulations were issued only in a tentative form and are still under consideration by the board. Recently there has been considerable discussion of the matter in the newspapers, and no little misapprehension has resulted, some of the papers making the misstatement that these rules and regulations had been actually adopted. This is not the case, and the commissioner intends that the matter shall have full and fair discussion before the new rules are finally formulated and put in force."

New York City Health Department, May, 1913.

What Vital Statistics Should Be.

"Vital statistics are, in short, not vital; they deal with death, not life, with the 'finished product' only of our slack, slipshod methods. They ought to deal, not with the dead, but who they were, and why and how they died, and why they were not saved. Suppose the factory manager merely knew at the end of the year his total product! Suppose that even this piece of information related, not to the way business went last year, but to the way it went five years before! The modern scientific manager must know not just the total product; he must know also all about the product, the kind, the quality, the cost, and why it is not better for the price. The modern vital statistician must know not only the deaths, but why the health department is not stopping them; what its funds are; how they are spent or wasted; what work is being done; how much of value each division does; and all to one end of saving life."—Hill in *Journal-Lancet.*

Texas State Board of Health, February, 1913.

Use of Discarded Bedding for Charitable Purposes.

"An encouraging evidence of the keen interest taken in the various lines of work auxiliary to the general tuberculosis problem, is the request recently made by the superintendent of nurses that bedding and other articles of furniture which are so frequently released by their owners to be destroyed after the occurrence of tuberculosis, might be used instead for the benefit of those in need of and without such articles.

"This was not a new suggestion, as it had been made more than once in the last two years, but hitherto had been disapproved on the ground that such action by the department might be misinterpreted.

"The plan, however, seemed to promise so much assistance to the nurses in their social service work that, following this latest suggestion, the matter was formally laid before the board of health with the result that it was decided; that bedding and other articles which are in good condition and which are released by the owners to be destroyed after disinfection, may be kept by the department and used for the relief of other needy patients, provided the person from whom such articles are obtained surrenders same with the understanding that they are to be disposed of as the department may decide, and not with the understanding that they are to be fumigated and then destroyed.

"For the present, arrangements for such disposition of these articles must be made by the nurse with the person who surrenders them, and upon her direction they will be returned to the person in need of them. When such a person is not known to a nurse at the time, she may arrange with some other nurse for the proper disposition of such discarded articles."

Communicable News, New York City Health Department, May, 1913.

Smallpox Prevention.

"The following letter from Dr. N. Hayes voices the sentiment of most sanitarians and epidemiologists that have to deal with epidemics of smallpox. It is becoming increasingly evident that it is wrong in principle to tax the community for quarantine measures in case of smallpox when every person may, at but little expense and pain, secure immunity against the disease. If, then, every person may with certainty secure freedom from smallpox, why should those who secure such immunity be taxed to protect those who refuse or neglect to do so? Several states have already abolished absolute quarantine for smallpox, simply requiring a placard to be posted as a warning sign, and all those who choose to have the disease rather than be vaccinated or who are not afraid of the disease may go into such placarded houses at will. Doctor Hayes' letter follows:

"'The quarantine against smallpox should cease after a year's notice to that effect. This would affect the safety only of those opposed to smallpox vaccination. It is childishly sentimental, and does not rise to the dignity of official red-tapeism to continue to nurse these superstitious defectives as we have in the past.

"'Public duty for the common welfare begins where the power of the individual to easily and safely care for himself ends. The anti-vaccination sentiment is maintained by sectarian 'medicine' and their willfully blind and prejudiced retainers. Society has arrived at a stage where it has no right to enforce vaccination nor to quarantine variola cases.

"'The only rational and efficient method to deal with the antivaccinationists is to let them alone with good will and good feeling. It should be plainly set forth to the public from time to time that vaccination is not dangerous if properly done, and the sore arm that is so much dreaded is unnecessary, and is rightly chargeable to the vaccination.

"'Your valued opinion on the proposition would be received as a compliment and a favor.'"

Kansas State Board of Health, Bulletin, March, 1913.

Canned Goods in Bakeries.

"At a meeting of the Board of Health of the Department of Health held April 8, 1913, it was decided that, upon approval by the sanitary superintendent in each case, the secretary should issue to bakers permits allowing them to return condemned canned goods to the wholesalers and thus obtain the rebate to which they are entitled. This action of the board was merely an extension of a privilege which has for some time past been granted to grocers. The action of the board was taken upon a report of the sanitary superintendent which reads as follows:

"'At the present time an arrangement exists whereby grocerymen may return condemned goods to the wholesalers from whom they were purchased in order that rebates may be obtained and financial loss prevented. The Department of Health has never considered it proper to permit this practice in the case of bakers, but recently numerous applications have been received from bakers and bakers' supply houses requesting that a similar privilege be accorded them. I would recommend that this privilege be extended to bakers and bakers' supply houses provided the following conditions are complied with:

"'1. In each bakeshop there shall be a barrel, box or bin, suitably covered, upon which or over which shall be placed a sign reading as follows: The contents of this barrel, box or bin are unfit for human consumption, are not to be used as such and are to be returned to the persons from whom purchased, for condemnation by the Department of Health.

"'2. Immediately upon opening a case of canned goods, every can in the case must be inspected by the proprietor of the bakeshop or one of his agents, and all swelled cans shall be placed in the receptacle provided.

"'3. The proprietor of the bakeshop must notify immediately the persons from whom he purchased the goods, of the presence of any material for condemnation. This notice may be served upon the salesman of the house, or may be made in writing through the mail.

"'4. If any 'swells' are found in any bakeshop elsewhere than in the receptacle provided for under section 1, it shall be construed that these goods were to be used in the manufacture of foodstuffs, and therefore, action shall be taken against the proprietor of the bakery for having such material in his possession.'"

New York City Health Department, April, 1913.

Rural Health Boards' Problems.

"The lesson of prime importance that is to be drawn from the Canton outbreak of tonsilitis is that even in Massachusetts, where most of the matters pertaining to the public health are well regulated, the question of the rural community and what it can possibly do in an emergency is one not really well solved. It is distinctly to be understood that the number of cases in an outbreak is not a measure of the efficiency of the officers. In general an infection makes its way into the supply of milk or water, and its results after the natural time for the development of the malady will burst forth at once. The mischief is accomplished before it has given any sign of its presence.

"Even in the large cities such outbreaks are not uncommon, but here they are met instantly by the systems that cities are able to establish for themselves. Every case of typhoid, for example, that is reported to the Boston Board carries on the notification card the name of the family milk dealer, and two or three cases from the same supply set in motion the regular machinery which investigates and, if deemed desirable, stops the supply till it proves itself safe.

"When it comes to the country town the whole matter is on a different basis. The health officer may readily be a practicing physician with patients to care for, the health of the town being an occupation for less busy hours. He may or may not have means for testing the presence of bacteria in the specimens that he gathers; he may or may not be in touch with modern methods; he may be progressive or a back number.

"The Massachusetts town health official, as one meets him, impresses one as faithful and sincere. Of his own volition he assembles with fellow-officers three or four times a year to discuss the problems of the work. He receives in common with other members of his company some publications that deal with different aspects of sanitation. But, nevertheless, he is handicapped by conditions that are difficult to meet under existing methods. In a city, notification of disease, which is one of the most practical safeguards, may be reduced to a science, and may be carried by special regulation even beyond the general list set forth by the State. In the country without close attention this strictness may be relaxed.

"Inspection to attain its highest value must be impersonal; in rural districts this is hard to maintain, and, in fact, the farmers are so strong that some products—inspected generally—are sent by them to market uninspected.

"There is then the matter of 'cultures' of disease germs. In a great city if a physician will take his swab to the municipal laboratory he can have the determination in some cases made while he waits. In the country there is the distance to any laboratory, State or private, the bother of mailing and the difficulties of delay. Without question these circumstances militate against prompt determinations and quick action.

"In the light of modern efficiency even the best of rural officers may be working under conditions that are not up to the times, and herein lies the problem of the immediate future. Coöperation is becoming the watchword of the age. There is coöperation in water supply, in sewage disposal, it is lawful in the building of certain public institutions like hospitals, why not then coöperation of rural communities in health administration, dividing the cost and improving the men and the methods?"

The Boston Transcript, May 19, 1913.

The Friedmann "Cure."

"The developments in the deplorable Friedmann affair are bearing out the most pessimistic of the forecasts which accompanied the arrival of the treatment in this country. Open-mindedness has given way to scepticism and the latter to positive condemnation as the indefensible commercialism which surrounds the exploitation has failed to produce trustworthy evidence of clinical value.

"The preliminary report of the Public Health Service at the recent meeting of the National Association in Washington, and published elsewhere in this issue, is none the less damning for its reserve and conservatism; and the resolutions of the association itself represent the practically unanimous conclusion of those in the best position to judge and speak.

"The organized publicity on which the project rested has done its work only too well. The irresponsibility of a large portion of the American press and the psychology of the American people have been exhibited in a discouraging light. The loudly heralded 'boon to humanity' has been turned into a stock-selling scheme and we are now witnessing the spectacle of a scramble for as many of the dollars of despairing consumptives as can be gathered before the inevitable truth premeates the public mind. There is a hasty foundation of 'Friedmann Institutes' in the several states in an endeavor to keep within the law and to take advantage of the brief period of possible profits which still remains. The fact that physicians can be found to lend themselves to this malodorous proposition, while humiliating, should not be regarded as of undue importance. The position of the medical profession, certainly of the leaders, has been for the most part entirely correct throughout. Reserved judgment while reasonable doubt remains is both intelligible and necessary, and it is a cause for congratulation that this has been the general attitude of the profession. The very character, or lack of it, of those who will join in the present promotion may possibly hasten its inevitable end.

"An encouraging sign for the immediate future is the attitude of the daily press. What was at first a prevailing tone of encouragement for the scheme is rapidly changing to one of doubt and even ridicule. This will accomplish more than the united protests of the medical profession, which will certainly from now on be more vigorously made. It is doubtless true that in the few months left before the final word can be given a huge sum can be collected from the proceeds of personal privation and mortgaged homes. From a financial point of view the affair will have been a success. We can only hope that the coming reaction will serve to lend a fresh impetus to the movement founded on the only principles now known which give reasonable promise of results. Perhaps the lesson will have been worth the price."

Editorial, *Journal of the Outdoor Life,* June, 1913.

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SOCIOLOGICAL SECTION. REPORT OF THE SECTION COMMITTEE.

JOHN M. GLENN,
General Director Russell Sage Foundation.

Read before the Sociological Section, American Public Health Association, Washington, D. C., September, 1912.

This section was organized in Milwaukee in 1910. This is its first meeting. No meeting was held in 1911 because it seemed impossible to get a good attendance in Havana. Those of us who are members of the section appreciate highly the generous confidence and intelligent sympathy shown by the A. P. H. A. in admitting us to its membership in full standing. We hope that we may prove ourselves a useful addition.

The purpose of the section is to increase the social worker's knowledge of health problems and their interest in them, to bring social worker and health officer into closer touch with each other with a view to securing closer and larger coöperation between them; to bring to both a clearer recognition of the fundamental relation between social and health problems; and thus to develop the potential power of both to win and hold the interest and support of the public.

VALUE OF AMERICAN PUBLIC HEALTH ASSOCIATION TO COUNTRY.

Many social workers have recognized the value of A. P. H. A. and felt that acquaintance and close alliance with its members was essential to the success of their work.

They have also felt that their knowledge of the practical effects of social facts and conditions, and their experience in methods of informing the lay public and arousing interest in matters affecting human life and health are necessary to the health officer. Health officer and social worker has each his own field to cultivate; but each will do his own work more thoroughly and effectively if he knows more about what the other knows and is aiming at. There must be coördination, that is to say, delimitation of the respective fields, definition of the respective functions of each and concentration on his special work by each, so far as is possible—and there must be coöperation in devoting the resources of each fully to the service of the other and in an unhesitating use by each of the knowledge and discoveries belonging to the other. Close alliance, with mutual confidence, between health officer and social worker is inevitably necessary to victory in the war against disease and its promoters.

The health officer must enforce existing laws, he must investigate the facts of disease and make known the results, he must originate new plans for the elimination and prevention of dangerous evils of which the public is now aware. His most important work, however, is to educate the community to its own responsibilities and opportunities, to arouse it to action and to help it to take care of itself. Little progress can be made until the active and sympathetic support of a considerable proportion of the public is won. The first step in this education is to compel the public to realize that a department of health is quite as important to their welfare and progress as any other branch of government. Good health is a prime factor in the progress of a community. Its relation to the success of what are called practical activities must be made as clear to the public as it is to us. Every $100 spent on good health administration will easily produce $10,000 worth of practical benefit to the community. A good health administration is worth more than a low tax rate.

But however able and intelligent a health officer may be and however comprehensive his authority and powers, he can do little effective work unless he is provided with a capable working force. No legislation is automatic. It is foolish for a legislature to direct that a thing shall be done or prevented without providing the means for carrying out its orders. Indeed, a good law which is not accompanied with sufficient means for putting it into effect, is likely to be a drag on progress, because it deceives the public into the belief that what is necessary has been done. For instance, if it is necessary to have legislation preventing unhealthy conditions of work, it is equally necessary to have intelligent and conscientious inspectors to insure its inforcement. The public must be taught to equip its health department with a vigorous and able force of workers. This being admitted, it follows that the head of a department of health must be a man of exceptional training, ability and moral power. He must have a sound knowledge of matters of hygiene and sanitation (and to this end more and better provision for training is greatly needed); he must possess capacity for organizing; and he must have the sympathy and force to win the public confidence and respect so that they may accept his teaching and follow his lead.

When such a man is found and consents to devote himself to the service of the public, it seems clear as sunshine that he must receive a reasonable compensation and be free from political influence and change. We cannot afford to let such a man go so long as we can hold on to him. That is a lesson to which the American public has been peculiarly blind. There is no greater weakness in our government than the frequent changing of city and state officers. In all these respects the social worker has a special responsibility and can be a valuable aid. Educational publicity is one of his special functions. He has been forced to it by the need of winning sympathy in order to secure financial support for voluntary associations and public support for legislation. He is becoming more and more expert in putting information into clear form that can be understood by and will attract the general public and in dispensing it through newspapers, magazines and other channels which reach large numbers of people. Much useful information has been hidden behind barriers of scientific expression and conventionality; it is the business of the social worker to learn what can wisely be made public and to put it in simple form and scatter it in such a way that the layman can not avoid seeing it.

Nothing seems clearer to the social worker than the strange fact that the lay public very rarely takes hold of a good cause or utilizes valuable social information or follows good examples voluntarily or easily. It is the usual experience that exposure of conditions that are degrading and dangerous is met with indifference; and that daily contact with fine specimens of socially constructive and effective work fails to stimulate imitation. It is necessary to proclaim the value of a good thing emphatically and interestingly, and with constant repetition. We must unceasingly push and persuade; and we must advertise the measures that we think are necessary to the public welfare. The public appetite does not long for them; it must be cultivated.

The social worker has also learned how to deal with legislative bodies to secure wise legislation. He understands the necessity for convincing the constituents of legislators and city councilmen, and persuading them to convince their representatives. He compels attention and respect from governmental bodies and higher officials, and here his disinterestedness and sincerity are strong points in his favor. So he can coöperate effectively with health officers in securing health legislation and he can bring strong outside support for requests for money or to back officials in good moves for the public good; he can ask for things that an official may not suggest.

The social worker has also much to contribute as a result of his own investigations and experience. He knows much about the environmental conditions that cause disease—bad housing, bad factory conditions, long hours of work, etc.; facts which are as necessary to the health officer as are his facts to the social worker. And he is doing much to lessen disease by procuring the elimination of destructive material causes.

THE DIAGNOSIS OF THE SICK CITY.

George Thomas Palmer, M.D.,
Superintendent of Health Department, Springfield, Ill.

Read before the Sociological Section, American Public Health Association, Washington, D. C., September, 1912.

Mr. Paul U. Kellogg, who has been aptly designated as the arch surveyor of the nation, likens the survey to a great blueprint of the community as a going institution. On account of a different training and a different point of view, perhaps, I am more inclined to compare the survey to the doctor's case record,—that faithful portrayal of the physical and functional conditions of the patient upon which we may base an accurate diagnosis and from which we may determine a logical and effective line of treatment.

In this case record we find a review of the ancestry, the heredity, nationality, home and work conditions, vocation and methods of play, personal habits, the nature of his food and drink, peculiar susceptibility or exposure to disease; a review of the physical defects found on careful examination and a list of the functional disorders or symptoms,—the very things which in the survey, we desire to ascertain regarding the community as a whole and its citizens.

The sanitary and health survey, which interests me most, is simply the systematic examination and diagnosis of the sick city,—but this is likewise true of any form of survey, social, moral, educational or religious. There are maladies of mind as well as body and even crime,—in this day of greater humanity and intelligence,—is looked upon as a form of disease.

But considering chiefly the sanitary and health survey, what cities may we regard as the proper ones for the services of the municipal diagnostician? I should say that any city which has any considerable typhoid fever mortality, say more than five per 100,000 of population, is a sick city; any city in which there is an infant mortality which may be directly or indirectly traced to an imperfect milk supply is a sick city; all those in which tuberculosis continues to reap its customary harvest are sick cities and all those in which preventable sickness and preventable deaths continue to occur are confessedly in need of special examination and medical care.

Measured by such a reasonable standard, every city in these United States is a sick city which will be the better for a careful diagnosis of its ills. And, incidentally, each city will be found to suffer, not from a single well-defined malady, but from an intricate complication of preventable diseases.

To be sure all cities are not willing to admit their physical and functional inefficiency. In spite of our intellectual advancement, we still see that municipal braggadocio which indicates a blind preference for comfortable but dangerous self-deception rather than the safer knowledge of the ugly truth.

In tuberculosis work we find the case records of several types of cases, all of which are so strikingly analogous to the results of municipal surveys that I am tempted to dwell upon them for a moment.

We find the advanced case;—frankly and obviously sick, his very appearance giving the lie to his optimistic claims of health. Like the frankly and rottenly sick city, this patient needs no one to tell him that he is a wreck and requires active treatment if he is to recover. But even in these advanced cases,—either individual or municipal,—an accurate diagnosis of the exact nature and extent of the disease is essential to any hope of improvement or recovery.

Then we find another type, the patient who realizes that he is not well but who attributes his indisposition to all manner of vague symptoms;—a man wholly unaware of the true nature of his disease. These are the cases where correct diagnosis, based upon careful examination, will indicate the proper treatment and will stay the progress of the disease.

Such are the cities whose intelligent citizens realize that something is wrong and where the hit-or-miss methods of oldtime empiricism will not forestall deplorable results.

Then there is that interesting group of cases where real illness is not even suspected; where the patient resents the slightest inference that he belongs to the army of marked men; and yet where the trained eye and the skilful senses of the diagnostician detect the incipient disease which, if uncured, will one day sap the vitality and bring about complete wreckage. Such is the average active American city;—content in its ignorance of its illness,—the city in which only the foresight of the surveyor will prevent future calamity.

Today in the few moments allotted for that purpose, I want to present to you the case record of one sick city;—a city with no predominating symptoms pathognomonic of a definite ailment, but one in which there was just enough evidence of indisposition to prompt the employment of modern diagnostic methods. This case record is the story of the so-called "Sanitary Survey of Springfield";—a modest study of the sanitary conditions of a city of fifty or sixty thousand people which resulted I believe in a proper diagnosis of the city's illness and which has already brought about considerable improvement in municipal conditions.

At the time we undertook the sanitary study of Springfield, if someone had suggested such a thing as a "sanitary survey" I should have replied that we were not in a position financially or otherwise for such an ambitious undertaking.

As it was we knew that Springfield was showing some symptoms of functional disorder and we simply started out to ascertain the causes of these symptoms and without the faintest idea how far our studies would carry us. We knew that the city had a higher typhoid fever mortality than other cities of like size and similarly situated. We knew that we had houses and tenements that served as centers of infection and other diseases. We realized that our infant mortality was too high. We started out simply with the purpose of ascertaining the causes of our undue morbidity and mortality—with the idea of making a definite diagnosis—that we might be able to take intelligent steps to decrease sickness and prevent death.

In 1910 Springfield had a typhoid fever mortality of something over 40 per 100,000 of population. This mortality had been as high as 85 per 100,000 and the last year recorded showed a mortality of 52. That was twice as high as it should have been. Half of our deaths from this disease were apparently unnecessary.

Four million dollars had been expended by the city for water works and sewer system, and the mains extended to all sections of the town. We made repeated analyses of the city water, extending over a long period of time, and found that the public supply was always safe for domestic use. We had to go further to locate the cause of our excessive typhoid fever mortality. Analyses were made from 150 samples of supposedly good wells. All but three were found to be dangerously polluted. Then the question arose as to the extent to which wells were used in the city and the cause of well pollution. On these points, as is true in practically every other city in the United States where wells are used, reliable information was entirely unobtainable.

There was but one thing left to do and that was to have the four underpaid, untrained but enthusiastic inspectors of the health department visit each of the 9,000 homes spread over the 1,600 blocks of the city to locate every well and vault and to ascertain the general sanitary conditions of all premises. It required two months to cover the city, the work being done in addition to the rather exacting routine duties of the department. The results plainly told the story of our typhoid fever.

The 9,000 homes of the city had 6,000 shallow wells, the pollution of which was guaranteed by 7,000 privy vaults. There were 6,000 polluted wells in the city, and the water mains and sewers were convenient to 5,000 of the premises that maintained them. That is the use of 5,000 of the 6,000 polluted wells in the city was entirely unnecessary. From a sanitary standpoint the city's expenditure of $4,000,000 was wasted.

I should make this statement about my home town with reluctance were it not that Mr. Hiram Messenger has advised me after studying the typhoid conditions of over thirty cities of from 40,000 to 100,000 people, that Springfield is now the only one in which he could obtain accurate data as to wells and well pollution.

But we were not content with this partial diagnosis. Our patient had typhoid fever; but there were unquestionably other complications.

Our tuberculosis death rate largely depended upon bad housing and house infection was inordinately high,—225 per 100,000 of population.

With this in view the inspectors in their house-to-house canvass, noted all tenements and bad housing conditions and the data furnished by them along this line afforded the basis for the housing investigations we have since carried on. We have studied, charted out and photographed the worst housing conditions in the city and we are now ready to do our part in convincing the Illinois General Assembly that there are slums in the smaller cities and that there is a crying need for good state housing laws.

In this housing investigation we took a tuberculosis census of the worst tenements and fumigated and disinfected as far as possible. We succeeded in improving the conditions of the worst tenements; but lack of state laws made satisfactory action impossible.

As I have stated, we were making this investigation entirely without a plan or system. Each undertaking when completed had pointed out something else that required attention, and at this juncture we found a new force urging us on. This was an aroused public interest. The better element of the people were watching to see what we would do next and the four daily newspapers of the city backed up our work and featured everything that was undertaken. This aroused interest was sufficient to hush all opposition.

We were now ready to consider our infant mortality. Our first effort was in the direction of an honest milk, containing a reasonable butter fat and total solids and free from preservatives. We recognized that this was a commercial rather than a public health proposition.

We realized that "the amount of manure the milk contains is more important than the amount of butter fat" and we determined to visit and inspect all the dairies furnishing milk to the city. In this tour of inspection we determined to teach the dairymen and farmers the prerequisites of pure and clean milk; but we warned all of them that inspection would be made from time to time and that the conditions of all dairies would be made a matter of public record open to milk consumers.

This investigation of dairies was followed by inspection of restaurants and bakeries, the details of which cannot interest you here. The results, however, were gratifying to us.

We are now engaged upon an investigation of garbage collection and disposal, studying our own conditions and the methods of other cities. We are trying to solve what I am inclined to regard as the livest public health problem of American municipalities—a problem, incidentally, which is not yet solved ideally be even the largest of cities.

The Springfield sanitary survey is not complete, nor will it be for several years to come. We are studying the town part by part and we are preserving all our data in the hope that we may be able some day to show a complete sanitary survey of a smaller city. But every step is being taken with a definite plan in view. We have to produce results and results we can show the people.

The people, as a rule, will give active coöperation to work of this kind. They will be tolerant of criticism of local conditions. But after awhile they will meet you with the essentially practical and entirely proper demand, "Now that you have given us all this undesirable publicity, what have you accomplished?" Incidentally they are not to be satisfied with a story of "interesting data." The only way you can safely use a town as clinical matter is to cure its sores.

We had now gotten sufficiently far in our diagnosis to begin to relieve the symptoms and our study of the case had made the line of treatment clear.

The results of our investigation were not bound in red morocco and filed away to decay, nor were they hopelessly buried in dreary and unread reports. We prepared a large map of the city, large enough to show each house by number and the gross sanitary conditions of all premises. Each unsanitary lot was shown in red and every well, vault, sewer, water main, vacant lot, business property and public building was indicated by symbol or color.

We knew the facts; but we had to demonstrate them to get results. The map was shown at a luncheon to three hundred members of the Chamber of Commerce, with a talk on "The Truth about Springfield." The business men endorsed our work and the newspapers gave the facts wide publicity. Next the map was hung in the council chamber and the members of the city council were shown why we should have ordinances compelling property holders to connect their property with sewers and water mains. The ordinances were passed in three weeks, although we had vainly sought to secure such ordinances for over two years.

Then another interesting thing developed. Protest on the part of the business men gave way to serious consideration. The work had gone too far to be stopped and it became the part of wisdom to fall in with it. Real estate men advertised their property on its sanitary merits and money became harder to borrow on unsanitary property. For the first time in the community, sanitation took on a commercial value.

During the house-to-house canvass the inspectors made notes of all unsanitary conditions and all nuisances and these were ordered remedied and abated.

For twelve years the average mortality from typhoid fever in Springfield had been something over forty per 100,000 population. In 1910, the year our investigation was undertaken, it was fifty-two. In 1911, the year after our agitation of polluted wells and the passage of sanitary ordinances, our typhoid fever mortality was in the twenties. The record of one year is not conclusive. Such a result immediately following sanitary agitation, however, is suggestive and encouraging.

In 1909, sixty-eight infants died from summer diarrhea; in 1910, even after we had a good commercial milk supply, there were sixty-four deaths. In 1911, after our dairy inspections, there were forty-one deaths. This may be coincidence but it is suggestive.

In 1910 there were 118 deaths from tuberculosis and that year housing investigations were conducted, a census of consumptives taken, infected premises were fumigated, a tuberculosis dispensary was established, tuberculosis nurses were placed in the field and a vigorous campaign of education was begun. In 1911 there were ninety-nine deaths from tuberculosis and our rate had fallen from 225 to 166 per 100,000 of population.

It can hardly be accepted as accidental that there was a fifty per cent. decrease in the typhoid mortality; a thirty per cent. decrease in infant mortality and a thirteen per cent. decrease in tuberculosis immediately following activity against these diseases especially when we note that the total number of deaths showed its regular increase in proportion to the increased population. And the element of coincidence is the more eliminated when we see that the mortality for the first eight months of 1912 corresponds with the low rate of 1911.

My only excuse for burdening you with the details of our work in a small mid-western town is to make you realize that the small town has real sanitary and public health problems unappreciated by the people, to demonstrate that reasonably good results may be attained without an elaborate plan and without any considerable expenditure of money. The same excuse will justify this additional detail.

The collection of data in our work was entrusted to four inspectors, already overworked and receiving $60 per month—men entirely without sanitary training and three of them with little more than a ward school education. They have served as sanitary inspectors, dairy inspectors, housing inspectors, as conditions required, their only instruction being such as we could give them; but each man being fully informed as to what we were trying to do and why.

In addition to the salaries of these inspectors, which had been paid from time immemorial, the total cost of the survey and the sanitary map to the city of Springfield was less than $100.

There is but one other thought in connection with our sanitary study. We were after a direct result, the reduction of morbidity and mortality. We are encouraged to believe that we have accomplished at least enough to justify the effort. But we now feel that we see other results more gratifying and far-reaching than we had anticipated.

Our work had been accompanied by unrestrained publicity. We accentuated the civic needs of the city in every way and we feel that we perhaps stimulated others to activity in their individual lines. We had demonstrated, perhaps, that civic improvement was not so difficult to bring about as had been generally believed and we had possibly stimulated a general spirit of investigation.

At any rate whether our sanitary investigations had anything to do with it or not, a great many things have come about during the past two years. A detention home has removed children from the jail and has simplified the work of an excellent trained probation officer. A tuberculosis association of 1,000 members operates a dispensary and employs visiting nurses. Medical inspection of school children has been established. The almshouse of Sangamon County is being thoroughly studied from medical and sociological standpoint and provision is being made for county care of indigent consumptives. The dispensing of county charity has been placed in better hands. But most important the people are awakened to the necessity of a through knowledge of local conditions, and a broad and sweeping survey of the city—a real survey this time—is being considered and is practically assured.

A SANITARY SURVEY.

Wickliffe Rose,
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Read before the Sociological Section, American Public Health Association, Washington, D. C., September, 1912.

The sanitary survey that is now being made in twelve Southern states is being conducted as a part of the work for the eradication of hookworm disease. The plan of work for the eradication of this disease in these states involves three main lines of activity:

1. An infection survey, made by counties, to determine the geographic distribution of the infection and the relative degree of infection in each infected area;

2. Getting the people who are infected cured; and

3. Removing the cause of infection by putting a stop to soil pollution.

Hookworm disease is preëminently a soil pollution disease; infection is communicated from one person to another only through the medium of polluted soil. If the soil were not befouled with human excrement, there would be no hookworm infection; if soil pollution could be stopped, hookworm infection would disappear from the face of the earth. In the work of getting control over this disease, therefore, the sanitary problem is quite specific and reduces itself in the last analysis to putting a stop to soil pollution.

To this end the state boards of health in these twelve states are undertaking by a systematic plan of education persistently and energetically conducted to bring home to the 20,000,000 of people in this territory the dangers of soil pollution and how to prevent it. As a part of this educational work these state boards are making a sanitary survey to determine the present conditions which are responsible for the presence and spread of hookworm infection in the infected areas in these states.

In February of last year the state directors of the work in conference in Atlanta agreed upon a uniform plan for conducting the survey in all the states. The survey is based on privy conditions and is designed to determine the degree of prevention of soil pollution. All privy types in use in these states were classified under the heads of "A," "B," "C," "D," "E" and "F" types. To each type was assigned its rating of efficiency on a scale of 100. Type "A" is the L. R. S. barrel privy and is rated at 100; type "B" is the water-tight, fly-proof bucket privy and is rated at 75; type "C" is the water-tight but not fly-proof privy and is rated at 50; type "D" is the closed-back surface privy and is rated at 25; type "E" is the open back surface privy rated at 10; and type "F" is no privy at all and is rated at zero. The survey is made by counties; it is based on the inspection of at least 100 rural homes. The number of homes inspected usually runs from 200 to 700; sometimes a thousand. The inspector while on the ground records the privy conditions as of the A, B, C, D, E, or F type. When the inspection for the county has been completed, the sanitary index for the county is estimated as follows:

1 at 75 per cent. (Class B)	75
2 at 25 per cent. (Class D)	50
165 at 10 per cent. (Class E)	1,650
58 at 0 per cent. (Class F)	00
226	1,175
	7–19/22
Sanitary index for the county	7–19/22

This means that the sanitary index for this county is in round numbers 8 on a scale of a possible 100.

The results of this survey are tabulated and mapped by counties. The survey was completed last year in 125 counties in nine states. A total of 43,448 rural homes were inspected; of these, 21,308 were found to have no privies. The work is still in progress but the results for the current year have not been summarized.

The survey is giving us a body of definite information on soil pollution in rural districts. This definite information is expected to serve a threefold purpose:

1. It defines the sanitary problem on which this fight for the eradication of hookworm disease is focused.
2. These facts when given to the people serve both as guide and incentive to effort for the improvement of sanitary conditions.
3. By comparing with the recorded results of our present survey the results of similar surveys made from time to time in the future, these counties will have a definite measure of progress in this one line of sanitation. This definite measure of progress will in turn become a strong incentive to effort for further improvement. If, for example, the people of a county should be shown that within a five-year period they had brought the sanitary index of their county up from 10 to 40 or 60, this consciousness of definite achievement would almost inevitably lead to the completion of the task. The incentive may be made even stronger by stimulating wholesome rivalry among counties in bringing up their sanitary index. If an aggressive commercial club should publish a sanitary index of 85 as a mark of distinction for its county, other counties would immediately organize to raise their sanitary index to 90 or 95.

This effort to get at the facts is being made as a first step toward improving the sanitary conditions which these facts exhibit.

THE MAGGOT TRAP—A NEW WEAPON IN OUR WARFARE AGAINST THE TYPHOID FLY.

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and

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Read before the Richmond Academy of Medicine and Surgery, June 24, 1913.

In the active work which has been undertaken by the Richmond Health Department during the past two years in connection with lessening the fly evil, we have made a number of observations along lines which, so far as we know, have not heretofore been brought out. These observations have for the most part tended to impress us with a sense of hopelessness, and we have been forced to believe that even the most active work could not result in anything approaching complete control of the fly evil.

It is not the purpose of the present paper to discuss these observations in full. We believe many of them to be important and to be furthermore unrecorded up to the present time. It is our intention, to incorporate these in a more exhaustive discussion of fly extermination than we have time to write at present. The object of this paper is to describe a new additional weapon which we believe to be of great value in fly-fighting work, and to enter briefly into the biological observations on which this method is founded.

Last fall we found in a number of instances streams of larvae of the housefly issuing from manure receptacles through any small hole or crevice which might be present. These larvae immediately sought the nearest point at which they could enter the earth and rapidly disappeared. On digging into the soil in such locations, we invariably found large numbers of adult larvae and of pupae. Although we found also large numbers of empty shells (indicating that many adult flies had issued from the location in question), we nevertheless felt that, observing these facts first in the fall of the year, this phenomenon might indicate that many pupae would winter over in the ground and emerge as flies with the return of warm weather. We may state parenthetically at this point that we have not found any indication of pupae actually so wintering over. The past winter was so mild that on no day on which we made observations did we fail to find active fly breeding going on in manure heaps.

With the return of warm weather this spring, we continued our observations along the above lines, and as a result of this we found that the larvae of the housefly remain in the manure heap only until they have attained their full growth as larvae, and that they then leave the manure heap and enter the earth whenever it is possible for them to do so. Where a heap of manure is thrown out onto the ground, examination shows regularly that nearly all the full-grown maggots are to be found on the outer edges of such a heap, and that from this location they rapidly enter the earth. Digging into the earth along the edges of a manure heap and for a short distance beyond the edge, we find regularly large numbers of pupae. Where the manure is in receptacles, we find that the maggots after attaining full growth work down to the bottom of the receptacle and leave it if there is any hole or crevice available.

We therefore announce the biological fact that the housefly does not pupate in manure if the full-grown maggots can find any means of reaching and entering the earth. The reason why this has not been heretofore determined would seem to be that observations have been made on manure in closed containers. Under these circumstances there is, of course, no way for the larvae to leave the manure, and they therefore enter the pupae state in the experimental receptacle of manure.

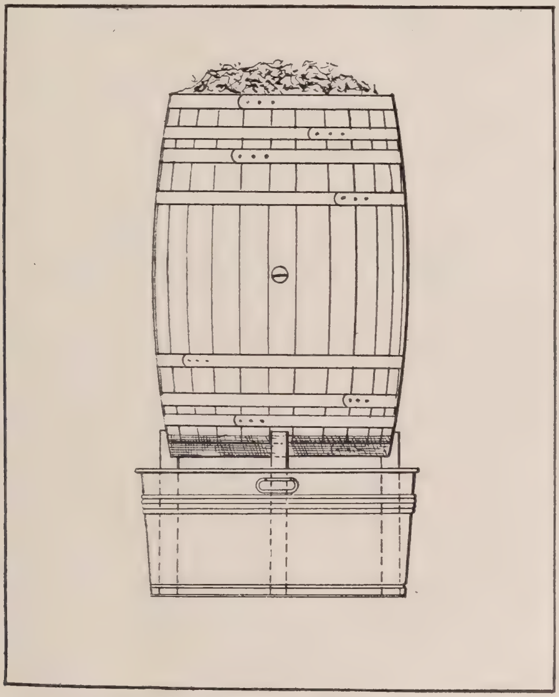
The bearing of the above facts is very plain, and when we had gone no further than this we felt that they enormously complicated our problem. We have held heretofore that if manure is removed to the country at regular intervals shorter than the minimum time required for the full development from egg to *fly*, we would not have flies developing in our cities, but the observations above mentioned changed this conception and showed that, in order to control fly breeding, our interval between consecutive removals of manure must be shorter than the minimum time from egg to *adult larva.*

It must be made very clear that the writers claim no originality for the observation that the larvæ of the housefly *may* leave the manure heap before pupating but they believe that it has not heretofore been recognized that the soil is the normal place for pupation and that therefore the adult larvæ *regularly* leave the manure heap if they find any way to do so.

Fortunately, however, these biological facts, which for many weeks proved most disconcerting, have now been turned by us into the basis of a most effective additional means of fighting the housefly. Three weeks ago we took a tight whiskey barrel, bored several large holes in the bottom of it, filled it with manure, and then stood it in a large tub, from the bottom of which it was elevated by several bricks. The top of the barrel was covered, so as to prevent the laying of more eggs in this manure. On the following day we found thousands of fully developed maggots in the tub, and, it having rained the night before, these maggots had all been drowned.

The maggots continued to increase in number for three days, after which it seemed that the number remained constant. We then removed the barrel, and on turning its contents out on the ground we found that it was absolutely free from maggots.

Since this initial experiment we have fixed up another barrel somewhat differently, by knocking out the bottom and replacing it with a piece of wire gauze stout enough to hold up the mass of manure, and with a mesh of about a quarter of an inch. This, of course, makes it easier for the maggots to find means of egress from the barrel.



The Maggot Trap. The maggots present in the manure leave the upper receptacle when they attain full size, holes being provided for this purpose. The writers have found that the house fly pupates by choice in the earth and not in manure. In their efforts to reach the earth, the maggots drop into the lower receptacle, where they are promptly killed, either by drowning or by poisoning.

We have not yet determined the best method of making sure that the maggots, once they have dropped into the lower container, can find no means of escape. An inverted wire cone (the exact opposite of the cone used in the large fly traps) must constitute one effective method. Simpler, however, is the plan of having several inches of water in the lower container. This should, of course either contain some effective poison or should be covered with an oil film, in order that our efforts for the control of flies may not result in hatching crops of mosquitoes.

We believe the above method to be one of great importance. Our observations have led us to realize that no matter how frequently manure is removed from horse stables, it is nevertheless impossible to prevent its becoming fly-blown in hot weather if it remains in the stable even as long as fifteen minutes after it is dropped. We must therefore regard all manure as fly-blown, and, in the absence of any practical means of killing eggs, larvae and pupae throughout the manure heap, the maggot trap above described offers, so far as we know, the only practical and simple way of ridding manure of fly larvae.

We wish to repeat that the above is only a preliminary announcement. We have ourselves worked out plans for manure receptacles of larger size, from which the maggots can be separated by employment of the same principle. These additional facts will be brought out in the more complete discussion of the subject which we intend to present shortly. Our chief object in describing the maggot trap at the present time is the hope that its merits will be recognized, and that it will therefore prove valuable in other cities during the two or three months of active fly-breeding weather which are still before us.

In closing, we wish to emphasize the fact that the maggot trap is not designed to take the place of any of our present methods of fighting the typhoid fly. We must still continue to advocate the killing of adult flies by traps, by swatting, by poisoning, and by sticky fly-paper. We must also insist on proper stable construction, on frequent removal of manure from the stable, and, in fact, on all those measures which have proved partially efficient in the past. We believe, however, that the maggot trap is an additional weapon of great value, solving, as it does, a phase of the problem which has heretofore appeared to present almost insuperable difficulties.

Some who read the above may be inclined to think that, no matter how effective the maggot trap may be, it is likely to be too disgusting to be of any practical value. As a matter of fact, this is not so. The maggots can be promptly destroyed each day, and if this is done, and decomposition thus prevented, maggots are by no means as disagreeable to handle as are flies themselves in the large numbers which we get together in our modern fly traps.

In addition to the advantages already discussed, the maggot trap offers a solution of a problem which we have felt sure would some day have to be met. Farmers are at present glad to get horse manure from the cities. We have feared that they would sooner or later come to question whether the value of this manure compensated them for the hordes of embryo flies which they bring to their farms with it. The maggot trap offers a perfect means of giving the farmer manure free from this objection.

Received for publication, July 9, 1913.

THE MEDICAL STATISTICS OF SEX HYGIENE; SUCH AS THEY ARE.

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Baltimore.

The prefatory essay in Volume VIII of the "Tenth" Edition of Britannica was written by Karl Pearson, and it contains some important paragraphs on medical education. The concluding sentence is as follows: "An elementary training in the handling of statistics, and an insistence on the nature of scientific reasoning and statistical proof, seems an urgent need which ought to be, but is not, provided for the preliminary scientific education of the medical profession."

On the preceding page there is an illuminating foot-note: "In the course of the past twenty years, the writer has received a scarcely intermitted flow of papers and letters from pseudo-scientists, circle-squarers, perpetual-motion mongers, heredity-theorists, neo-Darwinists, and others. The common feature of all these productions is the failure to grasp the elements of a real scientific *proof*. If the authors were classified by profession, the general medical practitioner would lead in numbers, the engineer being second, and the theologian a comparatively poor third."

To be thus bracketed with engineers in a charge of inaptitude for numerical argument, is not very depressing, perhaps, to physicians; for engineers are supposed to be rigorously trained in the use of figures. But physicians have supplied, and must supply, the quantitative statements concerning mortality and morbidity which necessarily attend the growth of preventive medicine; and it must be regretted that such statements are frequently infirm, sometimes absurd, and occasionally harmful.

The recent exhibition held in connection with the International Congress on Hygiene and Demography was rich in quantitative data, and statistical misadventures were exemplified there in variety. Nourishing as the east wind, some of these numerical confections were, and none more flatulent than those published by the American Federation for Sex Hygiene. The Federation's exhibit contained a section on Eugenics, and here one might see how efficient a service the science of numbers can render, when in competent hands. But the nearby area, wherein medical men attempted to deal with venereal disease, was a wilderness of illusion. Here we might see the hopeless amateur, beginning without a knowledge of whole numbers, proceeding without a sense of fractions, achieving a childish confusion of ratios, facing about and developing out of the ratios those miraculous numbers which seem to be the chief sustenance of crusading zeal.

The Federation distributes a pamphlet which makes the following first numerical statement concerning the prevalence of prostitution and the earnings of prostitutes:

"Facts to be Taken Away and Used!

HOW AMERICANS SPEND THEIR MONEY.

Immorality and the social diseases (estimated)	*$3,000,000,000
Intoxicating liquors	2,000,000,000
Tobacco	1,200,000,000
Jewelry and plate	800,000,000
Automobiles	500,000,000
Church work at home	250,000,000
Confectionery	200,000,000
Soft drinks	120,000,000
Tea and coffee	100,000,000
Millinery	90,000,000
Patent medicines	80,000,000
Chewing gum	13,000,000
Foreign missions	12,000,000

*Estimated on the basis of 300,000 public prostitutes and 1,000,000 clandestine prostitutes, the latter a ridiculously low estimate. No estimate is included covering the care of the sick, blind, insane, paralytic, or the expense of infant funerals."

It will be observed that the Federation's prostitutes cost $2,307.69 each, and that the Federation labels its concoction as *fact*. The only trouble about this "fact" arises out of other facts, namely, that the males of this country, above the age of 15, are fewer than 30,000,000, more than 60 per cent. married, and so far from wealthy that their longest, strongest pull-all-together could not raise $3,000,000,000 for the support of prostitutes, even though all men should abstain, as one man, from alcohol, chewing gum, and foreign missions. If Fortune should remove this financial difficulty, three billion dollars worth of the commodity could not be disposed of for want of *potentia coeundi*. Nature is no prodigal, even in the matter of "procreant urge." Our 30,000,000 males are subject to many checks, among which we may include a few of the kind supplied by the Federation. Our apparent resources, in both cash and function, are subject to diminutions on account of the "thousands of cadets" (Federation), infesting the "highways and by-ways of our" 14,000 "cities and towns," supported by the wages of prostitution, and in number about half as many (they say) as the prostitutes; a subject to diminution by the numbers of males who cannot lift their own economic weight (equal to all between 15 and 18, and all above 65); subject to another dimunition by the male-above-15 element of those annually destroyed and disabled by the venereal diseases (according to the Federation's figures, 950,000 to 3,200,000 males above 15 are subtracted in one item, on account of syphilis alone); subject to a discount for whatever sexual expenditure is made in wedlock by

19,000,000 married males; entitled to some allowance for impulse subdued by old age or ill health; something for a tardy impulse, not irresistibly urgent on the stroke of 15 years; and requiring some abatement, I insist, in the face of the Federation's opposite belief, for the sway of conscience over the conduct of men and boys.

In the light of a few concrete facts, the Federation might have delayed for a few years at least, the announcement that the molly-coddled males in this country can deliver into the hands of the mollies, every year, one-fourth of all the money in the world, all the money there is in the United States, enough to pay a fourth of the world's total debt, a billion dollars more than enough to discharge the public debt of the United States.

This guesstimate has a twin. The two are as unlike as peas, and in order to distinguish them, their fond parents have labelled them. We are about to take leave of the first of these painted ladies, the one known as Factstobe Takena Wayandused. The other is known as Ultraconservative Guesstimate. She was first presented at the recent International Congress on Hygiene and Demography. Dr. Robert N. Wilson brought her out, and great things are expected of her. Following are her specifications:

"*Ultraconservative estimate of the number of public female prostitutes and their earnings.*

Cities.	Number of public women in each.	Total.
New York, Chicago, Philadelphia	8,000 8,000 5,000	21,000
5 cities of the second class, plus San Francisco (5,000)	1,500	12,500
11 cities of the third class	600	6,600
31 cities of the fourth class	400	12,400
59 cities of the fifth class	350	20,650
120 cities of the sixth class	300	36,000
2,176 cities of the class having under 25,000 population	200	435,200
		544,350

Earnings, $272,175,000. Ultraconservative estimate of average earnings per year, $500.

Estimating three clandestine prostitutes for every one of the 544,350 public prostitutes there is obtained a total of 1,633,050, probably a low estimate.

Estimating the earnings of each of these as $250 per year, the total obtained is $408,262,500 probably a small portion of the money that actually changes hands in clandestine immorality.

As a matter of fact, there is every reason to believe we are spending on immorality and the social diseases (estimated on the basis of 500,000 public prostitutes and 1,000,000 clandestine prostitutes the latter a ridiculously low estimate), no estimate being included to cover the care of the sick, blind, insane, paralytic, or the expense of infant funerals, not less than $3,000,000,000."*

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* Transactions of the Fifteenth International Congress on Hygiene and Demography, Washington, 1912, Vol. IV, Part I, p. 115.

With the specifications thus clearly before us, let us discuss the viability of Dr. Willson's "ultraconservative" guesstimate. Bear in mind that Dr. Willson considers here only the urban population of the United States, less than half the total population. He accounts for a total population of 42,623,383, including, he says, 2,177,400 prostitutes, supported at a cost of $680,437,500; a pitiful stipend of 85 cents a day for each prostitute, and a daily tax of 9 cents on each male; infant, child, or adult.

For the sake of stating a few elementary principles, in a situation uncomplicated by preconception, let us briefly consider *the frequency of ladies with green teeth.* Our universe of discourse is defined on the basis of sex, and its symbol is L, meaning *lady.* The negative symbol, l, is not required, but it must not be forgotten that l, meaning *no lady* (probably male) is the territory immediately adjoining our universe. Within the space L we shall make a distinction according to the presence or absence of teeth. The symbols will be T = *ladies having teeth* and t = *ladies having no teeth.*

Within the space T (*ladies having teeth*) we make a distinction according to greenness, and the symbols are G = *ladies having green teeth* and g = *ladies having not-green teeth.* Within the space L, we shall have four frequencies, T, t, G, and g, and of these four frequencies the last two must lie wholly within the space T = *ladies having teeth.* For safety's sake, if not for truth's sake, one should remember that in every such arrangement

$$\begin{array}{ll} L=T+t=G+g+t & \\ T=G+g & G=T-g \\ t=L-T & g=T-G \end{array}$$

It is necessary to be familiar with platitudes of this indestructible sort, and I beg the reader to mind these obviousnesses. In a quest of ladies having green teeth, we must travel, at times, by the light of conjecture, and these little fixtures are criteria for crude distinctions, such as *greater* or *less, probable* or *improbable, possible* or *impossible.*

Let us take a case in which L = 1000 and T = 667. We obtain a third value at once, for, in such a case t must equal 333 *ladies having no teeth.* Let us now guess at the frequency of *ladies with green teeth,* on the assumption that *green teeth* do not occur in a majority of instances. The test of every guess, remember, is G+g+t, which must always equal 1000. For a high guess suppose G = 333. Utilizing our previously deplored obviousness, we have

$$\begin{array}{ll} L=1000 & \\ T=\ 667 & t=333 \\ G=\ 333 & g=334 \\ G+g+t=1000 & \end{array}$$

For a low guess, Let G = 1. We have

$$\begin{array}{ll} T=\ 667 & t=333 \\ G=\quad 1 & g=666 \\ G+g+t=1000 & \end{array}$$

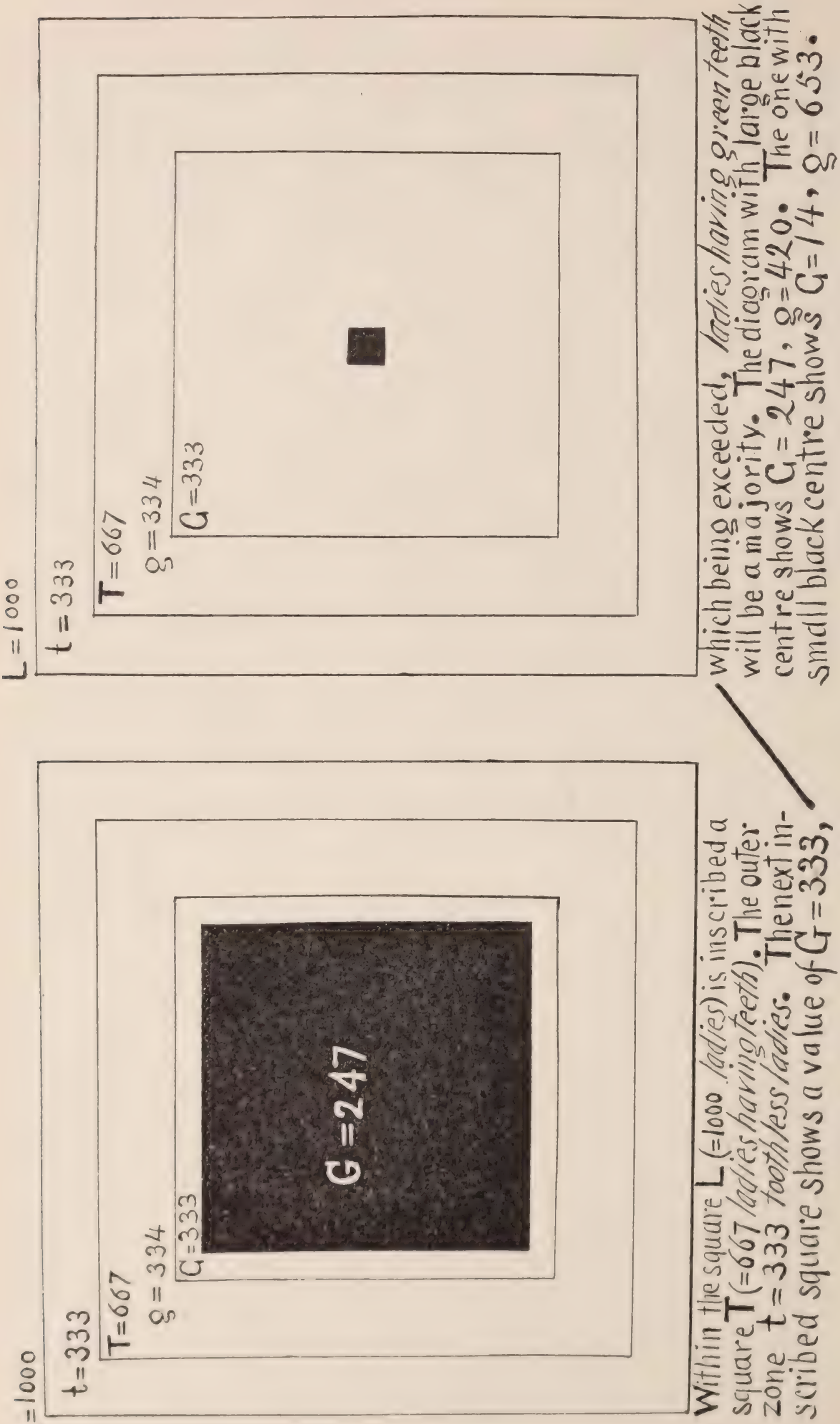
These two situations represent the limits of possibility under the conditions L = 1000, and T = 667. Very wide guessing would be represented by such values as G = 247 and G = 14. The accompanying diagram (see page 666) illustrates the whole of our argument up to this point. For the over-enthusiastic amateur, the nub of the matter is in the upper limit, G = 333, above which, teeth of emerald hue become uninteresting because they outnumber all other teeth possible to be found within the space T = 667. But if the relations L = 1000, T = 667 are not definitely ascertained, any guesstimate would be unjustifiable. With fewer than two legs to travel on, the pursuit of ladies with green teeth—believe me—is an extremely hazardous ramble. All this admonition, however obvious, is indispensable. Not all obviousness is impressive. Consider trousers; they do not plague you with their obviousness, even at their loudest. But think of the obviousness of *trousers absent* in some such cases as that of a gentleman enumerator of ladies with green teeth.

The Secretary of the American Federation for Sex Hygiene quotes a Census Bulletin, and it is evident that he had at hand the means of rational guessing. The LTG criteria, are not offered in evidence that Dr. Willson's "ultra-conservative estimate" of the numbers and the earnings of ladies with green teeth is too high, or to low; or that it is foolish; but only to show that very simple instruments, provided by his government, and placed in his hands, might have saved him from being as foolish as he was.

Out of the great resources provided by the Census Bureau for the use of American citizens, however indiscreet, I reproduce here two square inches of type which were before the eyes of Dr. Willson at the outset of his "ultra-conservative" estimate:

Territory urban in 1910.	Number of places 2,405.	Population 42,623,383.
Places of—		
1,000,000 or more	3	8,501,174
500,000 to 1,000,000	5	3,010,667
250,000 to 500,000	11	3,949,839
100,000 to 250,000	31	4,840,458
50,000 to 100,000	59	4,178,915
25,000 to 50,000	120	4,062,763
10,000 to 25,000	374	5,609,208
5,000 to 10,000	629	4,364,703
2,500 to 5,000	1,173	4,105,656

There is enough information in this small space to guide a man consistently, if not safely. Dr. Willson does not heed the very first whole number



Within the square L (=1000 *ladies*) is inscribed a square T (=667 *ladies having teeth*). The outer zone t = 333 *toothless ladies*. The next inscribed square shows a value of G = 333, which being exceeded, *ladies having green teeth* will be a majority. The diagram with large black centre shows G = 247, g = 420. The one with small black centre shows G = 14, g = 653.

printed by the Census experts, namely, 2405, which is the sum of the members of nine classes of cities. The sum of Dr. Willson's classes is 2406, and of this he is unaware, partly because he did not sum his cities, and partly because he added San Francisco to the cities of the second class, without subtracting San Francisco from the cities of the third class.

He might have tested his estimates by the populations as he went along, and so discovered the craziness of his progress. If his mental balance had been sensitive to differences as minute as, 416,000, he might not have lumped the last three classes of the Census distribution into one class; by this expedient saving himself some labor, though at the cost of landing himself (precociously, not unnecessarily) in the LTG box; which box will certainly hold him, for it is a replica of the impregnable cage in which Mr. Kipling's "Butterfly That Stamped" brought his terrifying career to a peaceful end.

I print here a table which takes into account the populations concerned in Dr. Willson's "ultra-conservative" estimate. (See page 668).

Following are the extremes of his numerical logic, stated according to the LTG formula, which expresses the facts, and therefore governs the probabilities, of the case:

Minimum.		Maximum.	
$L=1000$		$L=1000$	
$T=667$	$t=333$	$T=667$	$t=333$
$G=14$	$g=653$	$G=247$	$g=420$
$G+g+t=1000$		$G+g+t=1000$	

The value $T=667$ represents the number of females above 15 years of age, in a total of 1000 at all ages. The value $G=14$ is Dr. Willson's guess at the number of prostitutes in New York City, and in the third class cities.* The value $G=247$ is Dr. Willson's guess at the number of prostitutes in his seventh class cities. There is some contrast between cities having 14 prostitutes in every 667 women old enough to be prostitutes, and cities in which the women old enough to be prostitutes divide into groups of 247 who are prostitutes, and 420 who are not.

In Chicago, the women above 15, according to the reasoning of the Stamping Butterfly, are 97 per cent. virtuous; while in Evanston, it appears, that they are 37 per cent. prostitute. Boston women above 15, according to this reasoning, are 96 per cent. virtuous; those of Brookline, 94 per cent. virtuous; of Medford, 37 per cent. prostitute. In New York City (cleanest of all), women are 98 per cent. decent, in Mount Vernon, 94 per cent. decent, and in Montclair, 63 per cent. decent. It is conceivable that women

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* Fifth column of the table at (a), exact value 13.5.

† Fifth column of te table at (b), exact value 247.2.

Table showing how Dr. Willson's conjectures ("*ultraconservative*" *estimates*) appear, when stated in their relations to the populations of the cities concerned.

Class of Cities.	Population.	Prostitutes.	Rate per 10,000.	Females: all ages.	Prostitutes per 10,000.	Females above 15.	Prostitutes per 10,000.
3 Cities above 1,000,000	8,501,174	Public 21,000	26	4,250,587	P 52	2,833,725	P 74
		Clandestine 63,000	78		C 156		C 212
		Total 84,000	104		T 208		T 296
6 Cities (5+1)	3,427,579	P 12,500	36	1,713,789	P 73	1,142,526	P 108
5 cities 3,010,667		C 37,500	109		C 218		C 324
San Francisco 416,912		T 50,000	145		T 291		T 432
3,427,579							
10 Cities (11−1)	3,532,927	P 6,000	17	1,766,463	P 34	1,177,642	P 51
11 cities 3,949,839		C 18,000	51		C 101		C 153
San Francisco 416,912		T 24,000	68		T 135(a)		T 204
3,532,927							
31 Cities 100,000 to 250,000	4,840,458	P 12,400	26	2,420,229	P 51	1,613,486	P 77
		C 37,200	77		C 153		C 230
		T 49,600	102		T 205		T 307
59 Cities 50,000 to 100,000	4,178,915	P 20,650	49	2,089,457	P 99	1,392,972	P 148
		C 61,950	148		C 296		C 445
		T 82,600	198		T 395		T 593
120 Cities 25,000 to 50,000	4,062,763	P 36,000	89	2,031,381	P 168	1,354,254	P 266
		C 108,000	267		C 504		C 798
		T 144,000	356		T 672		T 1,064
2,176 Cities 2,500–25,000	14,079,567	P 435,200	309	7,039,783	P 618	4,693,189	P 927
		C 1,305,600	927		C 1,854		C 2,782
		T 1,740,800	1,236		T 2,472(b)		T 3,709
TOTAL.—2,405 Cities	42,623,383	2,175,000	510	21,311,689	1,020	14,207,794	1,531

(a) G=14 (b) G=247

may be too old to be prostitutes; conceivable that wedlock may inhibit the impulse to prostitution; probable that the tax of maternity is a factor of restraint; possible that these several factors, in their sum, are significant; for 65 per cent. of women above 15 are married, and about 7.5 per cent. are older than 60 years. But, whatever presumption is admitted in favor of age, motherhood, or wedlock, is admitted at the expense of those who lack the restraints of wedlock, motherhood, and age.

Once the LTG box has closed upon him, the Stamping Butterfly cannot ameliorate his situation by spreading the value of G = 247 over whole field of urban population. Turn back to the diagram and examine the black central squares, which show the precise dimensions of Dr. Willson's highest and lowest guesses. Five intermediate guesses are not diagrammed. The ladies in the G = 247 box are 4,693,189; the ladies in the remaining six boxes are only 9,514,604; so that the ladies in six boxes would receive very substantial and unwelcome dividends, if the excess in the G 247 box were awarded to them. An equitable distribution will give a uniform smear of prostitution 15.31 per cent. thick over all the women concerned, 14,207,793 in all, confirming Judge Lindsay's lightning calculation performed last summer at Columbus in the presence of the State Board of Health of Ohio.

The Butterfly is well within the truth when he speaks of his estimate as "ultraconservative." His investigating colleagues, of the Federation, have none of them, escaped, he says, without being "speedily convinced that there are "from three to five or more clandestinely immoral girls" for every public prostitute. The Federation has indeed an appetite huge and indiscriminate, like that of the Small Porgies who devoured King Solomon's world-feast in three mouthfuls. The Butterfly keeps back, with some regret, part of the truth perceived by Porgies, that there are 3,262,500 prostitutes in all; only one fourth of all the females alive above fifteen, and a little less than half the number between 15 and 35, in the population considered. "We need not estimate," he says, "a very large percentage of the *myriads* of *mills* and *factories* and *department stores* throughout this broad land to total 1,000,000 clandestine prostitutes." Very true. By inverting fractions one gets a new view. If unable to invert fractions, you can obtain the same view by standing on your head; but the chances are that one who cannot read fractions right side up, will behave pretty much like a Susy Damn when trying to stand either himself or his proper fractions improperly on the head.

A very few "myriads" of factories should yield the three million prostitutes required. If not identified in life, they should be revealed in death, and this charitable service Porgies (*i. e.* the Federation) has performed. Porgies says that 50,000 prostitutes die annually in the United States; and here public prostitutes are meant. This discovery proves the ultraconservatism of the Stamping Butterfly; for the death rate of the country for ages between ages 15 and 60, applied to a mortality of 50,000, will give more than five and a half millions of living prostitutes; so that, counting clandestines, we should have anywhere from twenty-two and a half to thirty-three and a half millions of prostitutes. Passing over the difficulty of making two or more prostitutes out of one woman, it can be argued that the death rate of prostitutes is high. The rate here used, 8.9, is a bit high, and it includes dead prostitutes, if any prostitutes died. Fifty thousand prostitutes are only one fourth of all the women, over 15 and under 60, who die annually in the United States. If prostitutes die as Judge Lindsay says they live, between 15 and 35 years of age, there would be only twenty thousand more prostitutes than decent women in the total death roll for the age period. Honor to the dead!

From the view-point of occupation, how inadvertent the Census Bureau must be, having failed regularly to register as many as 30,000 deaths in any year, among females from *ten* years of age upward, in all the "myriads" of factories, stores, mills, offices, schools, hospitals and other scenes of feminine wage-earning within the registration area!

It is impossible to accomplish a wholesale stupration of women without at least an equal stupration of men. The Federation should have said so at the outset, instead of at the end.

"*To one who knows*," says the Stamping Butterfly, "the 14,000,000 young men and the many middle-aged and even old men and the extent to which they prostitute woman kind, such an *insignificant* total as 1,000,000 clandestine prostitutes does *not begin* to correspond or to include the *actual army* of more sinned against than sinning *girls* and *women*, etc."

Deploring my inadequacy in controversy with those who know men in transcendent numbers, I yet protest that it is inadvisable to go beyond necessity in providing stupration for the girls and women now alive. The arrangements proposed, by Porgies on the one hand, and by the Butterfly on the other, are sufficiently liberal. Under the terms of the Butterfly formula, 9,235,066 married males have only to support 10,648,816 wives and concubines, while bachelors-and-widowers-above-15 (4,972,728 in number) can very readily support 761,250 prostitute daughters-sisters-mothers-grandmothers-above-15; the rate being only 2 strumpets for each group of 13 unmarried or widowed sons-brothers-fathers-grandfathers-above-15. A majority consisting of half the married and all the single males above 15 can probably satisfy the conditions, provided the women are not too exacting in the matter of cash tribute. The extremes of probable annual cost are $679,035,900 (*Butterfly formula*) and $5,007,540,625 (*Porgies formula*). Whatever ameliorations are possible must lie between the following extremes (*B. formula*); a greatest possible amelioration in the contingency that the number of wives and concubines together is 9,235,066 (*every prostitute being a wife*); and a highest possible aggravation in case the wives and concubines together are 11,410,066, all the prostitutes in this case being unmarried or widowed daughters, sisters, mothers, and grandmothers. The margin is not so wide as a frugal man would desire; for it amounts to only two and three-quarters millions, in a population of forty-two and a half millions of all ages and both sexes.

The situation is more difficult in those cities whose 3,050,573 married males must support 4,182,093 wives and concubines, leaving 609,280 additional strumpets to the care of 1,642,616 bachelors-and widowers-above-15, two strumpets being awarded to every five males, at an annual cost to unmarried males not less than $190,223,208.80 (*B. formula*), and possibly exceeding $1,405,840,486.40 (*P. formula*). It is fortunate that the cost of wives is unknown, for this permits us to figure wives at $0.00, and so to say that these 4,693,189 males, married and single, have to raise for their concubines each year from (*B. formula*) $543,495,168, to (*P. formula*) $4,016,025,600, or so much thereof as may be necessary to purchase a great big beautiful doll.

Where wives and concubines together cannot be fewer than 3,050,573,[*] and cannot possibly exceed 4,693,189[†], in such a situation the distinction of sex becomes relatively unimportant; the inhibitions implied by such words as mother, sister, daughter, become more than sufficiently decayed; and not much would be lost by emptying cradles, nurseries and kindergartens into the mess. Such are the consequences which flow from the irresponsible conjectures of Porgies and the Butterfly. My figures have not utilized the maximal factor for clandestinism. The factor least indecent suffices to show that almost anything, except success, may happen to one whose equipment for a statistical inquiry consists of two square inches of Census type, a claudicating number sense and the hoof-kinesis of a butterfly.

I have chosen a nauseous way of harmonizing the guesstimates with the facts because Porgies has a large swallow and a strong stomach, and needs a nausea. I hope everything will come up. Porgies has the habit of bolting his food in original packages—crates, barrels, bales, wire, glass, corks, labels and all. I shall open one such package in such a way as to show that it is imprudent to consume such packages in their entirety. Porgies is responsible for a widespread belief that anywhere from 50 to 80 per cent. of American men have had gonorrhea and that millions have syphilis. Porgies has swallowed quantities of such junk. I select for examination that package which is least immodest in its numerical results, and least irrational in its method, among the examples known to me.

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[*] *1,740,800 wives being also concubines.*

[†] *Because 2, 952, 389 wives-not-prostitutes plus 99, 184 wives-prostitutes plus 1, 641, 616 additional prostitutes required, amount in all to* 4,693,189 women, exhausting the supply of females.

This is a report of a special committee of a State medical society, published in 1908,* and very extensively quoted, especially by the Federation.

This study is said to have developed the fact that "about 46 per cent. of men over 21 years of age in our civil population" (that of a city of 550,000 inhabitants) "have had gonorrhea, and about 10 per cent. have had syphilis." The method of investigation was as follows:

The records of a large general hospital and dispensary were placed at the disposal of the Committee. Hospital-medical records were handled, one by one, until two piles were accumulated, one of the piles containing precisely 1000 hospital-medical histories, having each a note of inquiry as to past venereal infection. The other pile of hospital-medical histories contained no note of venereal inquiry. *No account was taken of the numbers in this pile.* They were the discard.

One by one, hospital-surgical histories were handled in the same way, until two piles were acquired: 1000 of the kind wanted; no one knows how many of the kind not wanted. One by one, dispensary-medical histories were handled; one by one, dispensary-surgical, in the same way. They stopped both the count and the discard when they had 4000 of the kind wanted. Having thrown away their whole numbers, in four denominate sorts, they now had left four equal arrays of denominate numbers; 1000 hospital-medical, 1000 hospital-surgical, 1000 dispensary-medical, 1000 dispensary-surgical; these four *equal* arrays being *unequal fractions* of *other four unknown unequal denominate numbers;* the latter, in their turn, being *unequal unknown fractions* of the material placed at their disposal. Having thus reduced themselves to utter helplessness, self-isolated from every possibility of relating these 4000 records to any other numbers whatsoever, bereft of every power except that of divination, the Committee announced that 46 per cent. of males above 21 in the City had a past history of gonorrhea and 10 per cent. a past history of syphilis.

Rather impatient business it is to say another word, but I started my criticism of this report with the statement that I do not know anything better of the sort. The insuperable barrier is, of course, the discard, the uncounted thousands (?) of records containing no venereal inquiry. The author assumes that the venereal content of the count is the same as that of the discard. This might be true, in some cases, on the theory that clinical inquiry is governed by even-handed chance and is independent of reason. On this assumption, a venereal inquiry and an inquiry concerning menstrual pains should occur with equal frequency in 1000 histories of males above 21. For a man who is convinced that clinical inquiry is governed by reason and not by chance, the question in this case is not whether, but how far, the venereal content of the count exceeds that of the discard. If one is sure that reason is far superior to chance in the clinical inquiry, and also convinced that antecedent gonorrhea and syphilis are important determinants of later sickness, then one may be sure that the venereal content of the discard was far less than that of the count; and if the numbers in the discard were greater than the numbers in the count, there is no telling what the depth of water may be, in excess of that required to drown a poor sailor.

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*Maryland Medical Journal, February 1908

If it were possible to accept these ratios as valid within the group of 4000 persons interrogated, we might infer that the incidence of gonorrhea, upon males above 21 in Baltimore, is much less than 46 per cent., and that the incidence of syphilis is much less than 10 per cent. But, unfortunately, the significance of the ratios is doubtful even within the group of 4000 cases.

It is impossible to make a rational guess as to the average age of this group of 4000 sick males. One confident assertion I make: their age distribution was immensely different from that of the male-above-21 element of the population of the city; and this difference is such that the venereal ratio of the count, once diminished by inclusion of the discard, must be diminished again when applied to the male-above-21 element of the population.

With equal confidence I make another trenchant distinction between these 4000 hospital patients and any chance group of 4000 males above 21 in the general population. The males in the general population enjoy a very great advantage over hospital males in respect to the number of instances in which it becomes necessary to say of a man that he is dead. I shall not discuss the difficulty of determining the relations between these 4000 sick people and their next of kin among the dead. The discard is just as effective a barrier on the side of the dead as on the side of the living; horse-high, bull-strong, pig-tight. In short, this Committee, beginning business with a good stock and in a good location, finished with "a beggarly account of empty boxes." Again I repeat that I do not know anyone who has had better luck in a similar inquiry.

Another sample of numerical junk, ingested by Porgies, is the statement that from 50 to 80 per cent. of cases of pelvic inflammatory diseases of women are due to gonococcus. Nonsense. The data underlying this hallucination are of such paucity that Porgies could swallow at a gulp all the women and all the surgeons concerned in it.

It is impossible, in one article, to deal with all the extravagances and absurdities uttered by the Federation; but it is impossible to close without a consideration of their worst result, namely, pollution of the minds of women. I know women who believe that, of three girls marrying, one certainly, and two probably, will get gonorrhea; that the gonococcus is present more frequently than any other pyogen, in the female genital tract; that the immense majority of men (90 to 98 per cent.) are habitually promiscuous in their sex relations, and that most of them began their lecherous careers before they reached their "teens." These are educated women, very valuable women, some of them, though seriously impaired by having accepted the doctrine of the Federation; and they are dangerous women, such of them as have responsibilities in public education. I confess myself disturbed by the "courage" and "frankness" of some female teachers of sex hygiene, though I believe that, for large numbers, it will be found impossible to root these hideous ideas in the minds of normal girls. There is, however, no escape from the experiment; it is now in progress. If it should turn out that numbers of girls can be thus indoctrinated, the resulting type of womanhood is likely to be man-proof, and in a racial sense nonviable. An equivalent maleness might possibly be produced somehow, but certainly never in the education of men by men.

You perceive, Porgies, that I have something against you in this matter of depraving the minds of women. For the time being, you have obscured in them that knowledge which, joined to faith, engenders life, happiness and honor: you have contaminated them with an obscene superstition, a filthy dream, speaking evil of dignities, without fruit, foaming out shame, twice dead. You have ravaged the nether-world to make a pedagogic slumgullion, and for garniture you have added something that you say is rare and has cost you a wide search,—a stint of clean and honorable men. Thousands, who never saw your face nor heard the music of your tongue, read your Levitical scroll, nailed upon the hoardings in Washington, declaring that a "majority of men and boys can with entire propriety be classed as prostitutes of the public or clandestine class." True as pus, and as laudable.

I am an average man, Porgies, and you are another—barring hallucinations. We should fail to decide, by mutual inquiry, which one of us is "it." I am confident that you have so lived your life that you can look me square in the face and tell me to go to the great gray green greasy banks of the Limpopo. Conversely, I can do as much or more for you. Save yourself trouble. Count me with the countless, as having a knowledge mine by nature as a brute, and in that knowledge not corrupted; among the countless count me heir, if not owner, of that greater knowledge, mine by nurture in a civilization more and more ascendant, charged with ghostly strength; count me with innumerable brothers who have been hurt and been helped, who fear something, hope something, strive something, believe something. I am of the earth, earthy, and need much sustenance, worldly and other-worldly. Not overconfident of keeping up with the procession, I am better than yesterday and worse than tomorrow. Cut me out of the herd, or separate me from the examples that I love among yoke-fellows, team-mates and friends, and I shall be less able to keep my hands and tongue in the way of honesty and truth, or to keep my body in temperance, soberness and chastity. In that case, Porgies, I shall need, and the least of my friends can lend me, a prayer more fervid and a faith less dim than yours.

I have not the hardihood to ask after the chastity of men or women. I do not wish to know. What I believe about them is infinitely more nourishing, and nearer the exact truth, than any possible derivative of all the facts possible to be ascertained. Since my experience, man and boy, is such that your statement is infamously false within that range, I believe it to be infamously false as a general statement. In the absence of any reason to believe or to suspect the contrary, I am bound to believe, and heartily do believe, that the immensely overwhelming majority of men are abundantly worthy to be trusted in that relation which you say it is their habit to dishonor. This is the true faith, Porgies, sure as ever you were a babe in arms.

In this article, I have shown that two of your principal experts have not so much as kindergarten credit in numerical argument; I have made a general implication of like infirmity in other sources of your quantitative information. Of your opinion concerning the morals of men, set forth without support of any kind, impossible of proof, lacking every sort of utility save in the acceleration of degeneracy, what less can I say than that its utterance is indefensible, immitigable. To preserve the massive reek of superstition, which is your introduction to sex hygiene, is to meet a thief and to compound with him; it is to be a partaker with the adulterers; it is to speak evil of your brother; it is to slander your own mother's son.

Your great progenitor, Prince A. Morrow, founded a Society of Sanitary and Moral Prophylaxis. He wrought into this title more substance than the Federation has since acquired. All but single-handed, Dr. Morrow removed an ancient prejudice, and opened a new field of preventive medicine. He stated the terms of the problem in such wise that we who follow will not be able to improve his statement. The infective mode of the venereal diseases, he said, is volitional. Here indeed is where the battle will be fought; here or nowhere will it be won—with the unruly wills of men. In his view, the first, last, and chief requirement of so great an undertaking lay simply in the application of a principle old as human aspiration; and he was armed for it, not out of the meager resources of medical science, but out of the vigor of complete manhood. He had no theory of pandemic depravity. Extensive learning and long experience in his specialty bred in him no cynicism, nor betrayed him into any intemperance of speech or writing. Search his writings for the manifestations of a cynical, fanatical, or mystical mind, and you will go unrewarded. Search the same scriptures for the activating truth about the social diseases, and you will be adequately informed and motived. There is no quality of brain able to move as much in a lifetime as Morrow moved. He had the understanding heart, and so his strength was as the strength of ten.

IMPORTANT NOTICE FOR MEMBERS OF THE A. P. H. A.

Are you planning to be at the Colorado Springs meetings? It is certainly hoped that you are as from present indications it seems certain that the 1913 gathering of the Association is to be well attended. Both the scientific and social programs are unusually attractive and a pleasant and profitable time is assured to all.

The preliminary announcement, giving full information, will be sent to members in the near future. Be sure and read it over! If you do this we believe it will be a great inducement to you to make your plans to be present. Special features of entertainment are being arranged for ladies who accompany the members.

A CONVENIENT ANAËROBIC JAR FOR PLATE CULTURES.

Stephen DeM. Gage and James H. Spurr.

Read before the Laboratory Section, American Public Health Association, Washington, D. C., September, 1912.

During some recent investigations at the Lawrence Experiment Station in which it was necessary to make many counts of anaërobic bacteria, it was found that the type of anaërobic jar usually employed for this purpose was not only too small for routine work on a large scale but occupied too much space in the incubator in proportion to its plate capacity. Furthermore, not only is the first cost of these jars high, but being equipped with glass stopcocks which are easily broken, frequent expensive repairs or renewals are necessary.

During 1912 a new type of jar was devised for this work in which most of the disadvantages of the older type of anaërobic jar have been eliminated. This consists of a straight-sided specimen or museum jar five inches in diameter inside, fitted with a brass cover into which are tapped two small petcocks. To the bottom of one petcock, and extending about one inch inside the cover, is soldered a short brass nipple to which is attached a rubber tube leading to the bottom of the jar. In use the jars may be filled with hydrogen or any non-corrosive gas in the same manner as the ordinary anaërobic jar. The covers are made gas-tight by the use of a well-greased or leaded rubber gasket and are held securely in place by a clamp over the top with a single large set screw. The plates are carried on shelves in a light metal rack which fits inside the jar.

The museum jars in a variety of sizes may be obtained from any of the larger apparatus dealers, the five-inch jars being made in four different heights. The eight and twelve-inch jars are most convenient for ordinary work, the former holding eight and the latter fifteen plates in addition to a dish for alkaline pyrogallate. These, including glass covers, screw clamps and rubber gaskets, cost $1.40 and $1.65 each respectively. The glass covers were used as a pattern in casting the brass covers, which including petcocks, etc., cost about $2.80 each at a local foundry. The cost of making the metal racks for the plates was about $1.00 each.

The complete first cost of jars of this type is somewhat less than that of the usual type of anaërobic jar, while the saving in breakage and in convenience is considerable. The jars themselves are of heavy glass and will stand considerable rough use. The brass covers are practically indestructable, and being interchangeable on all jars of the same diameter, may be transferred to a new jar in case of breakage, or from one jar to another of different height as the number of anaërobic plates varies from time to time.

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THE SOCIAL SURVEYS

A new agency which gives promise of more systematic and premeditated planning to meet the health, sanitation and general social needs of the community has been developing in the last few years. We refer to the Social Survey. As in the case of most new inventions, whether for social, industrial or commercial advance, necessity, together with the availability of means for meeting the situation, figure among the chief causal factors. Antecedent to the survey stand at least two important facts, first the recognition that communities are active not static forces, that they develop, that changes in material and human relationships occur continuously, and that with them come new social and civic problems which must in many cases be diagnosed and prescribed for anew; and second the fact of scientific advances along lines which make possible at least some measure of solution of the problems. Evidences of these changes are abundant; many of them are found in the rapid growth of cities in the last few decades. Villages in agricultural districts, instances where everybody knew everybody else, where the pulpit had long been the chief or only influence in moulding public opinion, where the air was unclouded by the smoke from factory stacks, where the water supply was not complicated by pollutions, where sunlight and building space were plenty, these villages in little more than a generation have leaped into the stature of cities with many of the more complicated problems of sanitation, health, housing, recreation, delinquence, city planning and so on. Moreover, while these changes have been taking place, women in large numbers have been entering many kinds of industrial life, the services furnished by the municipality have tended to broaden and increase and the number of foreign immigrants to this country for a decade and a half has grown to average about a million a year. These are tremendous changes. They are only a few, however, of the many which have introduced problems into community life calling for new study and constructive effort.

On the other hand a counter and more hopeful process has been going on, the development of analytical methods for diagnosing these problems and the accumulation of helpful information on corrective and preventive measures. The advances of Sociology, of education, government, public finances have been very marked, but not more so than the big strides which have taken place in the science of public health and sanitation, the fields which touch almost every side of individual and social welfare.

In the midst of this growth of corrective resources, on the one hand, and the changes causing new community problems on the other, the survey has been brought into use. Through it the current problems and the proposed remedies have been brought together. In other words, the survey has meant the application of scientific methods for social betterment. In the few years since the first city survey made in this country nearly a score of cities have completed surveys and the idea has appealed to civic and social leaders in many other cities of the country. Leading citizens, city officials, chambers of commerce and other commercial organizations have begun to see the business wisdom of using the survey as a means for making the city a better place to live in and hence a better place to do business in. In a very large proportion of the cities where surveys are under contemplation, the local people have laid special stress upon the investigation of sanitation and public health and in a few cities these subjects are to be taken up first and exclusively of others.

WHAT STATE CONTROL OVER STREAMS HAS DONE IN PENNSYLVANIA IN SEVEN YEARS.

SAMUEL G. DIXON, M.D., LL.D.,
Commissioner of Health of Pennsylvania.

Read before the American Public Health Association, Washington, D.C., September, 1912.

Pennsylvania was once famous for the development of its waterways long since supplanted by its famous system of railways. Before the canal times, in the days of the early settlements, the custom of permitting the animal wastes to reach natural water courses was not considered a filthy one, nor is it so regarded today in the minds of many people. In those days the subject of stream pollution was relatively unimportant. Now the situation has changed.

As civilization has advanced and transportation facilities by land and sea have been extended, the development of many neglected nooks and corners of the state has followed until now, Pennsylvania, with her 30 cities, 930 boroughs and 1,000 odd townships and 8,000,000 of people, is thickly populated. Contemplating the fact that the state's noted natural resources are becoming rapidly exhausted, that the output of natural oil and gas is diminishing annually, and that the time when her anthracite and bituminous coal fields will cease to supply the demands of the country is easily forecasted, it does not take the sober mind long to grasp the idea of the importance and necessity to the welfare of the people of the Commonwealth of the adoption of a plan of conservation of the soil and water resources.

Blessed with favorable geographical position and topography, with a favorable climate and diversity and richness of soil, with good harbor facilities on Lake Erie and the great port of Philadelphia on tidal water and rich in water power to be conserved and utilized, there is no reason why Pennsylvania should not maintain its prestige if it only will husband its resources. And I have particularly in mind the soil, the forests and the streams, while conservation in the best use of our combustibles will help postpone the day of want.

As the population increased and became scattered everywhere, all kinds of wastes, concomitant with human existence, were permitted to go directly into the streams. From the beginning there was no check to this custom until now the pollutions have become so numerous that few rivers of Pennsylvania remain pure and crystalline. Many of them have become as offensive as open sewers. The lower portion of the Schuylkill River is notably the most polluted of any in the country. The Youghioughany notably receives more mine water than any other stream in the state. For miles upon miles beyond these fields all animal life is extinct in the waters. So also have cities and towns, and individuals been permitted to discharge their wastes into open waters until they believed the rivers to be the natural drains for filth. The expense of doing otherwise before the year 1905 appeared to be so great as to preclude a change in policy. However, the consequence of permitting this state of affairs to exist indefinitely has forced itself upon the consideration of able legislators. Pennsylvania has been a notably typhoid-fever-ridden state due to the defilement of its sources of water supply. With a full realization that corrective measures must be applied and that the quality of natural waters as a resource of Pennsylvania must be conserved, the Legislature of 1905 enacted a bill entitled "To preserve the purity of the waters of the state for the protection of public health," and placed the responsibility upon the governor, the attorney-general and the commissioner of health of calling the attention of municipalities, corporations and individuals to the necessity of instituting comprehensive plans for the ultimate discontinuance of the discharge of crude sewage into state waters.

In some sections of Pennsylvania, manufacturing interests are hard put to it for a sufficient supply of pure water to conduct their enterprises; and municipalities find it barely possible to supply their citizens with potable water. State regulation and control of streams has come rather late but not too late. The responsibility for the establishment of a comprehensive state policy respecting the purity of natural waters was assumed by the three state officials mentioned. The problem was carefully studied and a policy was inaugurated and is being worked out in the interests of all concerned. There are so many physical conditions obtaining that no general rule has appeared practicable for the entire state. It has been more rational to work out the policies by watersheds and districts where the conditions were peculiar to the territory in hand. Without some such control ultimate ruin so far as water supplies are concerned would be the inheritance of succeeding generations. Had foresight been taken fifty years ago a hundred million dollars could have been saved to the people of today. The State Constitution, the laws of taxation, the so-called semi-prescriptive rights established by custom, and the sentiment of the people, all are pertinent factors to be counted with in the solution of the problem.

Where positive private menaces exist, they must be removed and at once so far as the police power of the state can operate. Where nuisances demand abatement, this work must be accomplished without unreasonable delay. The general policy adopted to meet the final end contemplated by law, is the compulsory adoption by public and private corporations of comprehensive plans to be executed in part, from time to time until ultimately the whole shall have been consummated. Particularly with respect to municipal sewerage systems, the plan aims to prevent thoughtless extravagancies which result when sewer extensions are made piecemeal, instead of along a line of a comprehensive plan.

In 1905, when the State Department of Health began to administer the law, few towns in Pennsylvania had adopted a system of sewers worthy of the name. Extensions were on the desultory order, and costly mistakes followed because of lack of plans and system and of business methods. Now all this is changed. Practically every town in the state where sewer systems are being extended, has been compelled to adopt a comprehensive sewerage system and to build all sewers, that are laid year by year, in conformity therewith. The saving to the municipalities throughout the state by this business procedure is believed to be in the aggregate, a large sum annually. To be sure, it has taken firm dealing with the local authorities to bring this about since the work is not such as to attract much attention; but it is fundamental and very extensive and altogether to be desired in the interest of the taxpayer and of good government.

The plans contemplate ultimately the treatment of the sewage. A marked enlightenment of public sentiment has transpired during the seven years' administration of the law in Pennsylvania, but even today there is ignorance of, and opposition to, the enforcement of the law. Some towns would rather be permitted to go on carelessly. It has been my policy to spend considerable time in conference with local officials having charge of sewers, in an effort to enlighten them fully with respect to the reasonableness of the state's policy more particularly as applied to their town's own selfish interest. This has been a laborious task rewarded with a measure of success.

It is sometimes difficult for the town councilman and the citizen to appreciate that the state does not wish to control or usurp the prerogatives of the municipal authorities or to limit their discretion, except as necessity arises in the interest of the public welfare.

No municipal or private corporation, or individual, possesses the right to defile a stream of water with sewage to the prejudice of public health and the destroying of riparian rights below. It is within the necessary power of the state to regulate a change in the pollution of streams if this becomes necessary for the public health. A town is not separate and apart from the balance of the state. It is not all sufficient in itself. Its powers are borrowed and created by the Legislature; it is the state that is sovereign and not the town. The State of Pennsylvania has created in the State Department of Health an agency in the important function of government of looking to the preservation of the public health in so far as the purity of the waters of the state are concerned, and the decisions under this law, of the governor, attorney-general and commissioner of health are for the purpose of directing other agencies of the government such as municipal authorities, in carrying out changes and improvements necessary to protect the public health. When this feature of the situation is thoroughly grasped by citizens and authorities of towns there is no further difficulty except that of ways and means by which the improvements shall be brought about.

The law provides, with respect to sewerage, that no sewer system can be adopted or extended without application to, and a permit from, the commissioner of health. The petitioner is required to employ a competent engineer to make the necessary plans. The office of the department is open for consultation and advice. A private engineer may secure consultations in the field if this be necessary. His plans must first be adopted by the corporation and then they must be submitted to the State Department of Health for consideration and when approved, modified or amended the commissioner of health issues a decree and the town then proceeds to build the sewers year by year and street by street in conformity with this plan, which will lend itself ultimately to the proper and economical disposal of the sewage. The control of the sewage at the point or points of outlet into water courses, is the great object of the law. A town in Pennsylvania is not permitted by the Constitution to have an indebtedness of over 7 per cent. of its assessed valuation. This operates to prohibit the erection by the municipality of a treatment plant in some places. In other places where there is financial ability to meet the expense of sewage treatment, the necessities may not warrant an expensive layout; but the fact should not be overlooked that modern methods for the treatment of sewage even at best are expensive, and they put upon the municipality a very considerable constant cost for operation. It is to be hoped that advances in the art will be made which will permit of treatment of the sewage at a less cost than at present. At present, the cost of treating sewage to effect nitrification of the organic matter, will range from $30,000 to $60,000, first installation, per million gallons of sewage treated. In many of the towns of Pennsylvania the existing sewer systems do not lend themselves readily to the adaptation of such extensive works.

On July 1, 1912, there were fifty-two sewage disposal plants being operated in Pennsylvania under the supervision of the State Department of Health. The number includes works for cities and towns, villages, real-estate developments, hospitals, institutions and industrial establishments. Six hundred and twenty-eight sewerage permits and decrees have been issued up to July. Each order has involved a thorough field investigation by engineers of the department, as well as by engineers employed by the applicants.

The most particular detail work of stream preservation which the department does, is accomplished on the upland watersheds which are sparsely populated areas where inspection and patrol can easily prevent the waters from becoming polluted.

Less particular work in preventing stream pollution is done on the larger watersheds where may be located villages, towns and cities, the drainage of which is into a stream subsequently used as a source of water supply. The refinement in sanitation readily accepted as practicable for the upper watersheds, would be impracticable if enforced on these lower watersheds. In the latter two safeguards are necessary, the diminution of sewage pollution as far as practicable, and the filtration of the water supply.

The third kind of work accomplished by the department's field officers relates to various insanitary conditions within or without the villages and towns. Pollution of the ground water supplies, such as wells and springs is a matter for investigation and action by the state. The commissioner of health is charged to preserve the purity of the ground waters in the urban as well as in the rural districts. In many villages and hamlets throughout Pennsylvania, general practices respecting the disposal of household wastes are insanitary and not infrequently the cause of disease and mortality. These subjects are properly investigated by the department since there is no other body having jurisdiction in the 1,500 townships wherein reside about one third of the population of the Commonwealth. The remedy for nuisances in built-up communities is often found in extensions to the sewer system or in the installation of such a system. Considerable time must be allowed for the discussion of matters of taxation incident to a public improvement of this nature. It is not practicable to accomplish immediate abatements of many pollutions of streams within municipalities.

Since the department has been established there have been investigated by a force of stream inspectors of the department, 418,749 properties on which 71,300 pollutions were actually abated. This work has paid for itself in reduction of sickness and morbidity throughout the Commonwealth, as I will show you later.

The law cited prescribes that no water works for the supply of water to the public shall be constructed or extended, or additional sources of supply be secured without a written permit from the commissioner of health given by agreement of the governor and attorney-general. When an application is made an inquiry follows to determine whether the proposed supply be prejudicial to public health and whether the apparatus, facilities and methods by which the water is to be collected and delivered to the consumer are calculated to best preserve the purity of the waters.

Precedent to judgment in any particular case, full information as to the source of supply and capacity, the manner of collection and the means of distribution, is indispensable; with respect to the source, principally as to danger to be guarded against and means necessary for protection; with respect to capacity, because, besides other reasons, where a supply be altogether good and limited, consumers may be compelled by shortage to have frequent recourse to private wells and neighborhood springs in close proximity to and polluted by cesspool or privy drainage, or other sewage contamination, or because recourse may be frequently had to a polluted stream as the supplementary supply, and thus spread disease among the consumers, conditions which the law does not contemplate that the state authorities should overlook or sanction; with respect to details, because, besides other reasons, the interests of the public health require that ample facilities for quick drainage or shutting off of any infection in any part of the system shall be provided, or, where a filter may amply purify water in ordinary times, during a fire the speeding up may be at a rate entirely beyond the purifying capacity and thus sewage water may be introduced into the town, or direct recourse may be had to raw creek water for emergencies. This, however, is done under special authority by those in control of the water supplies to break a seal of the water, valve, opening up a bypass with notice to the consumers to boil the water until further notice.

In connection with the subject, it may be important to know about the private wells and springs in the town.

For the dissemination of information, the permits set forth quite fully the local situation leading up to the conditions under which an additional source of supply or an extension to existing water-works will not be prejudicial to public health.

The stipulations refer to provisions for removal of sources of pollution, protective measures, such as sanitary patrol of watersheds and reports thereof, efficient operation of purification works, remedial measures to be adopted by approval or advice of the commissioner of health in case the supply or any part of the water-works system becomes prejudicial to the public health and other matters.

All surface waters are more or less dangerous. During the last seven years more attention has been paid by the Pennsylvania Department of Health to the compulsory installation of water treatment plants than to the actual compulsory installation of sewage treatment plants. While comprehensive plans for sanitary systems approved by the government are being worked up to as fast as circumstances will permit. At the beginning of 1912, there were eighty-one filter plants in operation in Pennsylvania. At the conclusion of the year a number of others will be added. Eleven of the eighty-one filter plants are of the slow sand filtration type; four are of the semi-rapid filtration type and sixty-six are of the rapid and mechanical filtration type.

The slow sand filters serve a population of 1,560,000 people; the semi-rapid filters serve a population of 90,500 people and the rapid filters serve a population of 1,410,000 so the population being served with filtered water is 3,000,000 or 40 per cent. of the total state population. The slow sand filters serve 51 per cent. of the people getting filtered water; the semi-rapid filters serve 4 per cent. of the people getting filtered water and the rapid filter serves 46 per cent. of the people getting filtered water.

Twenty of the filter plants are municipally owned and sixty-one belong to private corporations. The sources of supply are polluted with sewage.

Many of the filters are of old design or outgrown and overtaxed in capacity. Many of them are worn out. The class of men employed as attendants is not high enough to assure uniform and efficient treatment of the water. In consequence, there is in the engineering division of the department a number of assistants who are kept continually employed in making an itinerary of inspections of the filter plants. They make tests and offer suggestions and advice relative to improvements in operative methods and in extensions to the plant. These plans have to come before the commissioner of health for approval. The benefits of such state supervision are beginning to be appreciated by the water consumers and also by the owners of the filter plants. Some banking houses will not make waterworks loans unless the system has been approved by, or is being operated to, the satisfaction of the State Department of Health. Further, the government charters will be revoked if potable water is not supplied.

The attention which has been given to water supplies and sewage disposal and prevention of contamination of water and milk in Pennsylvania, during the last seven years, has resulted in a 60 per cent. reduction of typhoid fever. There has been a corresponding reduction in those ailments that accompany typhoid fever. This saving to the people of the Commonwealth, referring to typhoid fever alone, amounts to $15,000,000 annually. Everybody shares in the profits. Infected water knows no respect of persons. The warfare against this foe must be vigilant and constant until it is stamped out, and to fully and completely accomplish this there must be coöperation of states and nations.

PRINCIPLES OF SOCIAL SERVICE WORK AND THEIR APPLICATION IN PRACTICE AT THE STATE TUBERCULOSIS DISPENSARY, PHILADELPHIA.

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Anyone who has given the subject of Social Service Work sufficient attention to understand its aims must be increasingly impressed by its growing importance. What was a few years ago a somewhat idealistic effort to supplement in a limited way the medical service of hospitals, has today established itself as an essential and integral part of such service. It is indeed not only recognized as a necessary supplement to hospital work, but it bids fair to become ere long quite as important as the hospital work itself.

The reason for this is obvious, and lies in our clearer understanding of the factors in the social condition and life of the indigent, which are in large measure responsible for much of the sickness and distress to which poverty is heir. It lies in the appreciation of the fact that in treating the sick alone, we are in a large measure simply treating a symptom of an underlying social condition, a symptom directly due to bad housing conditions, bad hygiene, ignorance and poverty, and that if we are to apply the great principles of modern scientific and preventive medicine wisely and effectively, we must remedy and prevent the underlying causes of diseases, rather than rest satisfied in handling as best we may the ever-growing crop of such illness.

To carry this thought a little further, the principle of eugenics, one of the greatest problems of the age, is as Professor Moore of the University of Liverpool well puts it, not the survival of the fittest, not an attempt to rear a race of men and women whose resistance is attuned to living and surviving in a germ-laden world, who are capable of withstanding an utterly vile and vicious environment. It consists rather in forming a pure, healthy and happy environment, in making the world a fit place for all to live in, and then in producing the noblest and ablest race both physically and mentally to inhabit that purified environment. The application of this to the question under discussion, for it applies directly to the environment of the poor, is evident, because it is the function of social service work to improve the environment of the poor and sick in the broadest sense.

My reason for wishing to illustrate my remarks by reference to the Social Service Work of the State Dispensary (No. 21) for Tuberculosis,* is because it applies in a specific and definite way the principles governing Social Work in general; because the Department of Health has the means and facilities to make it a most efficient and far-reaching service, and has, I believe, set a standard for such work; and because we welcome intelligent and constructive criticism and advice.

In this relation it will be necessary to speak in general terms about the duties and relations of the nurses, and this paper will concern itself principally with this phase of the subject.†

FOLLOWING UP DISCHARGED SANATORIUM PATIENTS.

There are at present five nurses employed at Dispensary 21, two of whom give their whole time to following up the return cases from the State Sanatoria. Many of the cases sent by us to Mount Alto and Cresson, who were originally our patients, return for continued watching or treatment upon their discharge. A number, however, frequently because they consider themselves cured, do not do so. As soon as a case is discharged from the sanatorium, that information, with other data as regards condition on discharge etc., is sent at once to us. At the end of a stated period, if that case has not returned, the nurse looks it up, and gets it to come in.

This has the advantage not only of enabling us to follow systematically, and I may say, for years these cases; but it enables us to take up afresh the contructive work of uplifting and prevention in the homes. As must be plain to every one, this can be done much more effectively after the patient's sanatorium experience than before. That is the most effective time to attempt the introduction of sanatorium methods in the home. The patient himself must by experience have lived and learned these methods before you can get him and through him his family to effectively carry them out.

The nurses make out detailed reports on all cases discharged from the sanatoria, at periods of six months, whether our own patients or not. These will be and are valuable for statistical data. Practically all the data for reports as to subsequent results in cases discharged from sanatoria which have so far appeared in this country at least, have been made up from information gleaned by writing the discharged patient and having him fill out his own report. It does not tax the imagination unduly to conclude which is the more accurate, the answers to questioning by a trained worker (we have selected for this work the two nurses who have been with us longest) who in addition takes the temperature, pulse, etc., herself, and usually succeeds in getting the patient back to the dispensary for at least one re-examination; or such answers as a patient may see fit to make to a printed questionnaire. It is not in the least my purpose to cast any criticism whatsoever on the valuable reports which have been made following the latter method, but I spoke above of setting a standard in this work and that involves its obligations. As an index of the efficiency of this system, let me state the fact that of 443 patients from Philadelphia who were in 1909 discharged from Mt. Alto, the only cases of whose condition today (within six months) we have not full records, are 18 who are known to have left the city and so been lost sight of.

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* There are three state tuberculosis dispensaries in Philadelphia, with an aggregate ot about 1,000 cases under treatment a month: The Gray's Ferry State Dispensary, the Frankford State Dispensary, and the Philadelphia State Dispensary. They all follow the same principles as laid down in this paper.

† For an interesting and instructive exposition of some related activities of social service work among the tuberculous, consult the work of Dr. James Alexander Miller and his associates in connection with the tuberculosis clinics of the Bellevue and allied hospitals, latest reports.

Districting the City.

For the purposes of the regular dispensary service and inspection work, the dispensary limits itself to receiving patients from certain districts of the city, though as a state institution it is impossible for the dispensary to refuse any case no matter where they live, if they insist upon treatment. Usually by a little persuasion, however, we can get cases to go to the dispensary in their district, *i. e.*, nearer their home. For instance, we refer all cases which apply from the district south of Market and east of Broad Streets to the Phipps Institute of the University of Pennsylvania; the Gray's Ferry State Dispensary covers the district west of Broad and south of Woodland Avenue; and we coöperate in the same way with the Kensington Tuberculosis Dispensary and the Frankford State Dispensary. The section of the city from which we draw our cases is divided for purposes of our inspection and Social Service Work into three districts, with a nurse assigned to each, and this gives each of our nurses roughly speaking about seventy-five patients a month to take care of. These patients must be visited regularly every two weeks, which gives each nurse at least one hundred and fifty visits a month to pay, not including the visits to new cases.*

The Nurse's Duties.

Every new case which is admitted to the dispensary must be visited within one week of the day of admission. The nurses come in from their visiting work and report daily at 12.30 o'clock for one hour to the dispensary office, and the new cases according to the districts in which they live are assigned to the nurse having charge of that district. The advantage of having the nurse report daily to the dispensary at a time when all the doctors are there, lies in the fact that the doctor has thus the opportunity of talking over with the nurse the new cases which she is to visit and of making any suggestions which he has gleaned from the history and examination of the patient. It is thus possible too for the nurses to visit the new cases in the afternoon of the same day. The advantage of this close coöperation between doctor and nurse must be at once apparent. Further, each nurse is required to report to every physician one morning a month with the histories in hand of all the patients of that particular doctor which are on her list. This is valuable because in no other way can the doctor get so thorough an understanding of the home conditions and social problems of a given patient as by talking the situation over directly and personally with the nurse in charge. The mere reading of her notes on the history sheet of the case (for she must, of course, write up each visit she pays) gives at best but a cursory idea of the home situation. This system has the further advantage that the doctor can see at once from the nurse's notes, just how often his cases are being visited, and he further gets a very good idea of the capabilities of the different nurses from the manner in which they grasp and handle the social problems confronting them.

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*It need hardly be explained that often a nurse will have to spend much time and pay many visits in connection with a particular case, according to the social or medical needs.

It follows also that it is thus a relatively simple, though somewhat onerous task, for the physician-in-charge by going over all the histories for the previous month to know just how well each nurse is keeping up with the number and time of her visits. This is regularly done, and the nurses kept up to their work in a systematic way. Nor is this in any sense unnecessary in dispensary work, as some plan must be followed to check up the work of the nurses, who are on the street all day and practically without supervision, except in so far as the doctors interest themselves in overlooking their work.*

Coöperation Between Physician and Nurse.

This relation and coöperation between the dispensary physician and the dispensary nurse is of fundamental importance and can hardly be over-emphasized. The nurse should be thoroughly familiar with what the doctor wishes and thinks about a given patient; and the doctor must be thoroughly familiar with the home conditions and the nurse's plans and efforts. This coöperation and interrelationship is essential, and the responsiblity is mutual.

The Nurses and the Charity Organizations.

For some time the practice was followed of permitting the clerk in the office to telephone directly to the Society for Organizing Charity or other agencies in regard to details of cases, which could be more expeditiously handled in this way; but it was found that this was not as effective a method as might appear on its face, because the nurse in charge did not always know what had been done through the office, nor was the office always fully informed of the plans of the nurse in a given case (with such a large service it was impossible that this should be so), so that this course gave rise to conflicting plans and frequent misunderstandings and was abandoned. Now the nurse is responsible for her own cases and all that concerns them, and if a hospital or society organization is to be communicated with, it is done directly by the nurse herself, or only through the dispensary office at her request. Thus there is no feature or detail of a case with which the nurse in charge of the case is not familiar, and the active and responsible agent. Further the nurses are directed to consult personally with the district superintendents of the Society for Organizing Charity or other agencies about the planning or needs of a case, in order that their results may be more effective and that by the personal exchange of information and ideas, they may themselves be better informed and more competent.

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*In the State work there are also a chief nurse and her assistant, with headquarters at Harrisburg, who go from one State dispensary to another (there are 115 State dispensaries) overlooking and instructing the nurses.

COÖPERATION OF CHARITABLE AGENCIES.

In regard to our work and its relation to the Society for Organizing Charity and similar agencies, there are of course, no state funds which can be applied to financially assisting patients, paying their rent, buying food or clothes, or providing car fare to the State Sanatoria, nor is it wise that there should be; but as one or more of these is needed in practically every family we handle, it must be patent to every one the great part played by the charitable organizations of the city upon which we have to call so continuously and which respond so effectively and so unfailingly. This coöperation and supplementing by the private charitable organizations of the city is worthy of all praise, yet it is only just and right. If the state relieves private charity of the tremendous drain of medical care and treatment of these cases, it is only just that we should look for and expect this freely given response on the part of charitable organizations to our own unselfish efforts in behalf of the indigent sick. If this mutual coöperation is to be most effective, workers of the various organizations should understand each others aims, should follow the same lines and methods, and should work shoulder to shoulder to achieve a common end. This I believe to be very efficiently done by these organizations in Philadelphia.

THE TRAINED NURSE *versus* THE SOCIAL WORKER.

Apropos of this subject, the question presents itself of how a previous course of medical training affects social work. Is it advisable, speaking generally, that a social worker should be also a trained nurse? I should answer this by saying, only so far as all education and training tend to develop the character and ability of the individual. Certainly in general Social Service Work as done by the Society for Organizing Charity it is not necessary, nor even perhaps wise. Trained nursing and Social Service Work are today two distinct professions, though there is an evident interrelationship.

But in hospital work, where the element of sickness comes in, there is a different phase, and I imagine the tendency will continue to have trained nurses do this work. The experience and training of the nurse is admittedly a factor not only in her advice and supervision of the patient, but in her ability to detect signs of illness in other members of the family, and her knowledge of hygiene. It should be borne in mind, however, that general and simple rules of hygiene, or practically whatever special knowledge is required, may be readily acquired by any intelligent women, she does not have to spend three years in a hospital for this; and in emergencies a physician or the district doctor must be called in any way, so that the question presents itself whether the long and arduous training of the nurse is not out of proportion and unnecessry in view of the limited field social work offers for strictly medical experience.

Certainly the very first thing we have to impress upon our own Social Service Workers (who are all trained nurses) is to adopt the point of view of the social worker and submerge that of the trained nurse. They all begin by making notes which are filled with an account of the patient's appearance, strength, how he sleeps, and eats and whether his cough is better or worse; in other words, they approach the case from a medical point of view. This is not of great service to the physician, he can ask all those questions for himself when he sees the patient. What the physician wants is an intelligent account of the home conditions. Is his house clean, does he sleep alone, how many windows, how much air space; what are the financial resources of the family and the social needs? Then must important of all, there is the duty of rearrangement, readjustment, in the home, all of which is purely a social problem, with only the indirect medical bearing. So the point cannot be too emphatically made, in my opinion, that the trained nurse must, to be effective in this work, adopt the point of view of the trained social worker. She must not consider herself a very superior person, not be too opinionative, because she is a graduate nurse, which I regret to say is sometimes the tendency. She must look upon her R. N. very much as a business man does on his A. B. if he happens to have one, *i. e.*, forget about it. If she is to succeed and be useful, she must become a good social worker and the fact that she has been a good trained nurse (except as an indication of character and intelligence) will not of itself be of any vital importance to her.

In this connection therefore I would conclude that Social Service should be made a part of the training of nurses, that they may intelligently understand it, and adapt themselves to its point of view; and it would also seem wise if the training of professional social or charity workers should include pretty thorough instruction in medical and school hygiene and a knowledge of the course and management of the diseases with which they are apt to come in contact.

FREE MILK DISTRIBUTION.

The question as to whether a patient is to have milk sent to his home or not is left entirely with the nurse and no milk is ordered except upon the nurse's recommendation following her first visit. Nor is milk ordered routinely by the nurses, but only in those cases which are willing to respond to her views as to the improvement or changes necessary in their mode of life. In other words, the nurse begins at once to work on some definite problem which the particular home or family presents, there may be one, oftener there are many problems or phases of problems and it is only as the patient responds in the effort to help himself that he receives milk. I believe in giving milk if only for the reason that with this as a club we have better control and can consequently get better results than we possibly could without it. Milk is not continued in a given case for a longer period than six months (we give one quart a day) except in exceptional cases where it is optional with the doctor to continue it longer. But we find that after we have once got the patient's confidence and that of his family, which this period of milk giving enables us to do through our careful work and supervision, the mere stopping of the milk does not in the majority of instances cause them to cease coming. Aside from the absolute need from a medical point of view for this increased nourishment, the above is a very important element in it, and after the discontinuance of the milk for three or four months it is often renewed in those cases which have continued to come and seconded our efforts in their own behalf. I may say, that it is particularly gratifying to note the way our patients stick, we get to know them intimately and very many of them have been coming for years. And we are in relatively close touch with the great number who have returned to work, and ceased their regular attendance at the dispensary. From a reasonably large experience in dispensary work of the best type elsewhere, I have never seen anything to approach this phase of our work.

THE RESPONSIBILITY OF PATIENTS.

The social theory of this work is to help the patients to help themselves, to give them self-made opportunities for cure and improvement in their homes and we continually impress upon them their side of the bargain, their responsibilities. When a patient will not go to Mount Alto or Cresson without good reason, will not sleep with his windows open, or take care of his sputum, in other words, when they prove recalcitrant and unteachable, we simply discharge them. Such cases are relatively few and they have often returned to us after a short spell of being left to themselves, having learned their lesson in their own way and proved remarkably docile subsequently. We do not take this summary course in a hurry, we are long suffering; but where we become convinced that the patient is making no effort to do his share, is not responding, we withdraw.

Bringing in the Patient's Family.

It is unnecessary and indeed impossible to go into the detailed features of the work of the nurses so complex is it in its many problems, but as an index of the thoroughness of their work, I will point out one phase of it. It is a well-recognized principle in tuberculosis work for the social worker to try to get other members of the patient's family to come to the dispensary for examination. This is usually followed out with more or less consistency of purpose in most medical dispensaries, and I suppose that speaking generally it would be a very fair allowance to say that perhaps a case or two or a few cases are brought in from time to time by the nurses doing this work. We are not satisfied with this, but we insist that *every member* in the families of our patients must come in, and I am proud to say that I can show you case after case where we have never stopped until we get in for examination every single member of the family. We mark this on the face and at the top of our histories in red ink and the nurse's work in a given family, whatever else she may accomplish, is never considered completed or successful until she has got the entire family to the dispensary. In this way we are able to ferret out many incipient cases, which are still in a curable stage. That this is a very important feature of this work can be readily understood when it is appreciated that the small wage earner does not consult a doctor until his health is seriously imparied, long after the stage when he can be considered an incipient case, when his loss of weight, growing weakness and cough have really forced him to this step. If you expect to have the incipient case walk into the dispensary you will be grievously disappointed. They don't come, they don't know they are sick, and their friends don't know it. It takes a knock on the head to make them understand. The same thing is true of the cases sent in by physicians, they are all moderately advanced or far advanced cases. The great majority of the patients sent to the state Sanatoria are second and third stage cases.

We hear a great deal about the problem of the advanced case. He must be cared for on his own account and on account of the danger to his family and the community. This is essential and is universally recognized. But it should be remembered that at one stage of his disease, which probably was of considerable duration in point of time, he was *curable*. I regret to say that during this time he has probably passed through the hands of some physician, often more than one. How are we to get our benevolent claws on these cases? There are only two ways, the one outlined above, examine *all* the apparently well members in the families of your dispensary patients; and the second, teach and beg and instruct the general practitioner that he *must* turn over indigent or poor consumptives to those who can properly handle them, at a time when they can be most effectively handled. And in this connection, do not forget the children. Children of tuberculous patients should be systematically watched over and even treated in the so-called pre-tuberculous stage.

The Strictly Medical *versus* The Social Point of View.

In conclusion, I want briefly to speak about a broader phase of this work, which involves a confliction of interest, which is not only apparent but real, between the medical and social point of view in handling cases of tuberculosis, and I feel I must speak of it here because the sociological point of view is the correct one. This confliction of interest or of policy comes about from the failure on the part of physicians to appreciate one of the fundamental principles of tuberculosis dispensary work among the poor, which is first and foremost to get the case away to a sanatorium. This is necessary not only to give the patient the benefit of the cure, but also and quite as important for a preliminary course of education, training and segregation. For obvious reason's, one's instructions are infinitely better carried out by the patient and by his family *after* he has been to a sanatorium than *before*. It is infinitely easier to introduce (within reasonable limits) sanatorium methods in a patient's home after he has lived and learned those methods for himself, than by any amount of word-of-mouth teaching. But this is something which many physicians and dispensary workers have yet to appreciate and so they persist in an attempt to treat the patient in his home from the beginning, which is not only unfair to him, but to his family, and in this process they distort the home relations and needs and in making them subservient to the sick man, divert or misapply the purpose of social work. Because if the medical point of view is strictly carried out, it must mean that the whole household is made subservient to the needs of the sick member or members. In such a case there is a tremendous waste of charitable effort, for not only can little be accomplished in the last analysis for the sick man, but the whole family weighed down by this burden becomes dependent on charity. The function of social work among the tuberculous, as among other classes, is not strictly to treat the sick man and support his family, but to relieve the family of the burden of his sickness and make them self-supporting; to take care of him away from his family and to put him in such shape by sanatorium treatment, that he can finally play a part, however small, in the general maintenance, or at least cease to be a burden and a menace pure and simple. In other words, it is the distinction between unwise help, help that handicaps and pauperizes; and the principle of raising the self-respect, maintaining the solvency and lending a helping hand to elevate the whole standard of living in the family as a whole. No one can offer evidence to prove nor claim with a shadow of justice that among the indigent treatment at home can compare with sanatorium treatment, either as to results or prevention. Personally I believe this applies almost equally to the well-to-do. There is not one of us, I venture to say, whose first step if he developed tuberculosis, would not be to go to a sanatorium. While treatment in the home is not unproductive of results, it is gross self-delusion and unfair to patients to claim that home care can equal institutional care. "As long as tuberculosis is a communicable disease, so long will segregation which is best achieved in hospitals and sanatoria be the only logical protection for the community (Miller)." I emphasize this, because strange as it may seem are there not wanting those who vigorously combat this point of view. Every indigent case of tuberculosis in this state should be at once listed for a state sanatorium since the splendid sanatorium facilities make its admission and care potentially possible, and the case treated and supervised until it gets away. But the real work of cure, prevention, coöperative help and uplifting in the home, begins after his departure and upon his return, when the patient, and through him his family, may be most effectively handled and helped.

HYGIENE OF THE BACTERIOLOGICAL LABORATORY.

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The future of hygiene or preventive medicine has never appeared more promising than at the present time. With the numerous agencies that have been at work intensifying the study and broadening the field of hygiene it is no wonder that such wide-spread interest in the subject has been aroused.

The scope of hygiene is almost unlimited; and although there is much that still remains to be accomplished, the practical application of hygienic principles has progressed rapidly, as is so well illustrated in the bacteriological examination of the throats of children suspected of diphtheritic infection; in the scientific search for "bacillus carriers" in threatening epidemics of diphtheria, typhoid fever and Asiatic cholera; in the medical inspection of school children, and in the peculiar care and treatment given to the inmates of tuberculosis sanatoria. The methods which are employed in safeguarding the health of laborers in mines, factories, etc., especially in parts of Europe, are further examples of the intelligent application of hygienic principles.

It cannot be denied, however, that those who are best informed in matters pertaining to hygiene are often unpardonably negligent in applying their knowledge. This is no less true of the college teacher than of the investigator in a private, specially endowed or commercial laboratory.

The bacteriological laboratory should be a model, insofar as cleanliness and freedom from accidental infection are concerned. This goal is difficult to attain, however, and the writer himself does not claim immunity from all criticism. It is impossible to control sanitary conditions absolutely, especially when the number of workers or students is large. Some persons are more careless than others in the handling of pathogenic bacteria, no matter how much they may have been cautioned beforehand. Occasionally there is a man who is indifferent to all rules of precaution and who will even court a certain amount of risk. Such a person should, of course, be excluded from further participation in the work of the laboratory.

While the instances of accidental infection in the laboratory which have been reported are comparatively few, it is imperative that all danger be minimized as far as possible. All contaminated objects should be thoroughly disinfected or destroyed. This applies particularly to slides and cover glasses which have been used for motility tests; also work tables, wash bowls, etc. Accidental infection of wearing apparel or any part of the person should be followed by treatment with an effective disinfectant. It is to the following safeguards, however that I wish to call special attention.

The old-time wash-bottle is to be severely condemned. The use of this wash-bottle should be prohibited, not only in the bacteriological, but in the chemical and other laboratories, as well. It is impossible to prevent different persons from using the same bottle unless it is altogether excluded. The following type of wash-bottle serves as an admirable substitute for the one which requires application of the mouth.

No originality is claimed for this bottle. It was first devised for the laboratory by S. C. Markley, a graduate student in the department of bacteriology and hygiene of the Sheffield Scientific School. It is nothing more than an ordinary wide-mouthed wash-bottle to which an atomizer bulb has been applied. An ordinary milk bottle may be used. This wash-bottle is especially well adapted for the washing of slides and cover slips. One strong pressure of the bulb causes a constant stream of water to flow from the outlet tube for five or six seconds, after which the flow stops automatically. The size of the stream may be regulated, of course, by the size of the outlet tube, or its drawn-out end.

The individual towel and the sanitary soap holder have done much to improve hygienic conditions in the laboratory. The custom of treating the hands with a disinfectant solution like corrosive sublimate (1:1000) after the completion of work with pathogenic organisms should be adhered to. What is undoubtedly of great importance is the use of bacterial stains and staining methods whereby the organisms under observation are killed rapidly, so that the subsequent washing and handling of the cover glasses or slides becomes absolutely safe.

Although the object has been attained incidentally, the Ziehl-Nielson method of staining tubercle bacilli involves the immediate destruction of the life of the bacilli. In the first place, the application of Ziehl's carbol fuchsin results in the absolute disinfection of the film, in virtue of the large amount of carbolic acid which is present in the staining agent, namely 5 per cent. Combining with this the influence of the heating to which such films are usually subjected, the result is one of rapid and complete sterilization.

What has been said regarding the Ziehl-Nielson method applies also to the Gram method of staining bacteria. Both the anilin gentian violet and the Lugol (iodine) solution exert a strong disinfectant action. Exposure of bacterial films for as short a period as one minute to either of these agents is sufficient to sterilize the films completely providing no spores are present. This has been demonstrated in numerous experiments conducted in the laboratory.*

Cover glass films were prepared in the usual manner from twenty-four-hour slant agar cultures of the organisms tested. They were fixed by passing them through the flame of a Bunsen burner three or four times in the customary way. Anilin gentian violet was then applied cold for 60 seconds, after which the films were washed in sterile water. Sterility tests were made by scraping the films with a platinum loop and streaking slant agar tubes. Control tests were always made with similar films which were not treated with the gentian violet. The following organisms were tested: B. typhi, B. coli, B. pyocyaneus, B. diphtheriæ (two different strains), B. anthracis, B. megatherium, Staphylococcus pyogenes aureus and Streptococcus pyogenes.

When megatherium or anthrax spores were present the disinfectant action was not always complete when but 60 seconds were allowed, exposures of at least one and one half to two minutes being necessary. The spores which escape the fatal influence of the gentian violet are killed in the next stage of the staining process by the iodine solution, which is a most powerful germicide. It is desirable, however, that the disinfection take place at the beginning of the staining process, so that in the subsequent washing of the film no living bacteria remain to be scattered about by the very process of washing.

The almost universal use of the Gram stain is most fortunate, aside from its value as a differential stain. It is employed for practically all routine staining in the bacteriological laboratory. It cannot take the place, however, of the Loeffler methylene blue which is used everywhere for the staining of B. diphtheriæ and closely allied organisms.

In the regular Loeffler staining process the bacilli are not killed. Neither the passing of the slide through the flame for the purpose of fixation, nor the application of the methylene blue, brings about the death of the bacilli. In a series of experiments† we have shown clearly that a comparatively large number of the bacilli remain alive after the slide or cover glass has been passed through the flame three or four times. Overheating must, of course, be avoided, as the peculiar staining properties of the bacilli are thereby destroyed.

Futhermore, the application of Loeffler's methylene blue†, even for a period of two minutes, results in no appreciable, if in fact any, disinfectant action. Hence, in the washing of diphtheria slides for the purpose of removing the excess of stain living and virulent diphtheria bacilli are removed in large numbers, and under the conditions which usually exist, may lodge on the hands, clothing and other objects, and thus become a source of danger. The chance of becoming a diphtheria bacillus carrier should always be borne in mind, and will appeal to those in particular who are brought into close touch with children. It appears to be impossible to prevent contamination by the diphtheria bacillus unless some means is devised to disinfect the films at the beginning of the routine staining process.

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* This work was done by Mr. John Costello, a graduate student in the department. Acknowledgment is given here.

†These tests were made by Messrs. John Costello and A. B. Dayton.

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We have made many tests* with stains which act as disinfectants, and which might be employed as satisfactory substitutes for the Loeffler stain. Carbolic acid methylene blue solutions of varying dilutions, as concerns both the stain and the phenol, were used. The disinfectant action was most satisfactory in practically every instance, but the staining properties were without exception disappointing. Similar results were obtained with formaldehyde methylene blue in different dilutions.

Our object was attained, however, in the following manner. Immediately after fixing the film by passing it through the flame in the customary manner it was treated for one minute with Lugol's iodine solution. The iodine was removed by immersion for one minute in 50 per cent. alcohol. Following this the usual technique was employed, namely staining with the Loeffler methylene blue for one to two minutes, washing and mounting. The treatments of the film with the iodine solution and the 50 per cent. alcohol do not in the least affect the peculiar staining properties of the diphtheria bacillus; nor do they in any other way lessen the efficacy of the Loeffler staining method. The complete method as described here is being used in regular class work with absolute success.

The small amount of extra time involved in the process need not make it objectionable. In routine laboratory testing for the diphtheria bacillus very little effort and time need be consumed in the preliminary treatment of the films, for which the satisfactory results obtained are ample compensation.

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*These tests were made by Messrs. John Costello and A. B. Dayton.

A COMPARATIVE STUDY OF THE SMITH FERMENTATION TUBE AND THE INVERTED VIAL IN THE DETERMINATION OF SUGAR FERMENTATION.

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During the summer of 1912, a sanitary survey of Narragansett Bay was made under the direction of Prof. F. P. Gorham of Brown University to determine the extent of the pollution of the oyster beds of the State of Rhode Island by sewage of the neighboring cities and towns.

Lactose peptone bile was used as a presumptive test to indicate the presence of the members of the Bacillus coli group and other lactose fermenters of intestinal origin. In the early part of the investigation, the regular Smith fermentation tube, as used at the Lawrence Station, was employed in determining the production of gas in lactose peptone bile, but later shell vials inverted in regular laboratory test tubes were substituted for the fermentation tube.

Immediately the question arose—which was the more efficient in a presumptive work of this kind, the fermentation tube or the inverted vial? This paper is the result of a brief comparative study of the two varieties.

The technic was very simple. Fifty-two oysters from a bed situated in a portion of the bay which was known to be polluted were taken to the laboratory and opened into sterile Petri dishes as proposed in the Second Progress Report of the Committee on Standard Methods of Shell Fish Analysis, Laboratory Section, American Public Health Association, 1911. From the Petri dishes, the shell liquor was inoculated directly into the lactose peptone bile tubes. The fermentation tubes were inoculated in the following dilutions:

1 tube	1 c. c.	Shell liquor.
2 tube	0.1 c. c.	Shell liquor.
2 tube	0.01 c. c.	Shell liquor.

Scarcity of fermentation tubes forced us to economize by using only one tube in the cubic centimeter dilution.

The laboratory tubes containing the inverted vials were inoculated by Mr. George H. Smith, whom the writer wishes to thank for his labors, with the shell liquor from the same Petri dishes in the following dilutions:

2 tubes	1 c. c.	Shell liquor.
2 "	0.1 c. c.	Shell liquors.
2 "	0.01 c. c.	Shell liquors.

The inoculated tubes were incubated at 37° C. and readings were made at the end of the twenty-fourth and forty-eighth hour. Pressure of outside work prevented further readings. No attempt was made to isolate specific organisms as the writer assumed that the production of gas in lactose peptone bile was indicative of the presence of some lactose fermenter of intestinal origin. The presence of gas was recorded by the plus (+) and (−) sign respectively since percentages of gas produced in fermentation tubes and inverted vial are of no quantitative value.

The following table will show the comparative gas production of lactose fermenters isolated from oysters taken from regions known to be polluted in fermentation tubes and inverted vials:

TABLE I.

PERCENTAGE OF EFFICIENCY.

	24 hours.		48 hours.	
	No. of Tubes Showing Gas.	Per cent.	No. of Tubes Showing Gas.	Per cent.
Cubic Centimeter.				
Ferment. Tube..........	44	84.6	49	94.3
Invert. Vial............	49	92.3	50	96.1
One Tenth Cubic Centimeter.				
Ferment. Tube..........	45	86.5	47	90.3
Invert. Vial............	31	59.5	44	84.6
One Hundredth Cubic Centimeter.				
Ferment. Tube..........	17	32.6	29	55.7
Invert. Vial............	12	23.0	22	42.3

An examination of the above table will show that in the cubic centimeter dilution the inverted vial was slightly more efficient than the fermentation. At twenty-four hours the inverted vial was 8 per cent. more efficient but at the end of the forty-eighth hour they were nearly equal. In the tenth cubic centimeter dilution, we find just the reverse to be true. The fermentation tube is much more efficient at both the twenty-fourth and forty-eighth hour periods. At the end of the twenty-fourth hour the difference of their percentage of efficiency is 27 per cent. while at the end of the forty-eighth hour period, as in the cubic centimeter dilution, the difference is reduced to about 5 per cent. The same condition holds true in the hundredth dilution, except there is still a large difference in percentage of efficiency even at the end of the forty-eighth hour. From this little work, it would seem that the inverted vial is more efficacious in the low dilutions and the fermentation tube is more efficacious in the higher dilutions, as regards the production of gas in lactose peptone bile by lactose fermenters isolated from polluted oysters.

In a comparative work of this kind many irregularities in gas production have appeared which might be interesting to note. They have also appeared with great regularity in our main work on the Sanitaiy Survey. Carefully planned controls have failed to eliminate them from the work. Conclusions seem to point to some fault either in the method of making dilutions, since these irregularities were more apparent in the higher dilutions, or to the general inefficiency of lactose peptone bile. One of the most glaring irregularities which have appeared from time to time was the presence of gas in one of the duplicates and not in the other. The frequency of this condition may be noted in the following table:

TABLE II.

GAS PRESENT IN ONE DUPLICATE AND ABSENT IN THE OTHER.

Fermentation Tube.

	24 hours.		48 hours.	
	0.1 c. c.	0.01 c. c.	0.1 c. c.	0.01 c. c.
No. of tubes	22	13	22	21
Per cent	42.3	25.0	42.3	40.3

Inverted Vial.

	24 hours.			48 hours.		
	1 c. c.	0.1 c. c.	0.01 c c.	1 c. c.	0.1 c. c.	0.01 c. c.
No. of tubes	9	15	10	1	9	14
Per cent	17.6	28.8	19.2	1.9	17.6	26.9

From the above table it can be easily seen just how frequently these irregularities occur. They are more prevalent in the case of the fermentation tube than in the inverted vial. They also seem to occur in the higher dilution more frequently than in the lower dilution. The presence of these irregularities certainly demonstrates the fact that in presumptive work with lactose peptone bile we should not depend entirely upon the gas production in a single tube but should use duplicates at least and even triplicates, if possible.

SUMMARY.

As regards the production of gas in lactose peptone bile by intestinal organisms isolated from oysters:

1. Inverted vials seem to be more efficacious in the low dilutions than the fermentation tubes.

2. Fermentation tubes seem to be more efficacious in the higher dilutions than the inverted vials.

Irregularities show that it is not safe to depend upon a single tube to demonstrate fermentation but duplicates should always be used and, if possible, triplicates.

SIZE OF THE SAMPLE NECESSARY FOR THE ACCURATE DETERMINATION OF THE SANITARY QUALITY OF SHELL OYSTERS.

George H. Smith.

During the past three years while working at Brown University and for the Rhode Island Shell Fish Commission under the direction of Prof. F. P. Gorham, I have had occasion to witness and assist in the analysis of a large number of samples of oysters. Many times throughout this work the fact has been noted that in oysters taken from the same oyster-laying there was a very great variation in the colon content. Just how great this individual variation was or how important a part it played in oyster analysis has, so far as I know, never been determined. Thus, during the past winter and spring I have been conducting a series of experiments with a view to determining these facts.

It has generally been the custom, I believe, for a sample to consist of five oysters. In fact the Committee on Standard Methods of Shell-fish Examination of this Association in their "Second Progress Report" recommends that this number be used. Furthermore, I think that it is quite generally the practice to condemn as unfit for food those oysters which upon analysis and which according to the American Public Health Method of Rating Oysters for B. coli give a score of thirty-two or more, and to allow those oysters scoring twenty-three or less to be used as food, provided the sanitary survey does not show good reason why they should be condemned. Now in a sample composed of so few individuals as this, any one individual differing greatly from the others will influence the result very greatly, and the rating of the sample may be determined largely by this one oyster, whereas, if the sample were larger, the importance of one oyster would be greatly decreased. Thus it became apparent that the factor of chance might play quite an important part in the result of the analysis. When the analysis being made is for the purpose of determining whether these oysters are suitable for food or not this factor of chance assumes great weight. It is of vast importance to the oyster dealer in such cases just what oysters are chosen for the analysis. Also the health official should be concerned for it may very readily give him a false idea of the condition of the oysters which he is considering.

Not only in my own work has this variation been noticed but in examining the records of the analyses of some 230 oyster samples made by the Rhode Island Shell Fish Commission it was noted that in but seven of these did all of the five oysters comprising the sample show the same degree of pollution, and of these seven, five were so badly contaminated that the colon bacillus was found in every dilution.

The factor of chance of which I have spoken is a variable quantity and is of far greater importance and value in some cases than in others. Obviously, in badly polluted beds and in layings which are free from contamination, it plays but a very small part. It is in the middle region, that is, in those layings that are questionable, intermediate between the good and bad, that it reaches its highest value.

Thus these experiments were with the view of determining how great this factor might be and if possible to devise some method which would eliminate it and give a more true index of pollution. To this end I have made analyses of six different oyster layings in Narragansett Bay whose locations were such that one would expect to find both extremely bad and good oysters and also some of an intermediate condition. From each bed at one time were taken at least 125 oysters. These oysters were transported to the laboratory and divided arbitrarily into samples of five oysters each. These samples were then subjected to the usual analysis in so far as time would permit. By this I mean that lactose-peptone-bile was inoculated with the shell-liquor in the cubic centimeter, tenth and hundredth cubic centimeter dilutions and gas production in this media was considered to indicate the presence of some member or members of the colon group. In but few cases was the colon isolated. The gas production was noted at 12 hours, 18, 24 and every 12 hours up to 96 hours. I may here say that by far the greater part (some 97 per cent.) occurred during the first 48 hours. The results of the analyses were as follows:

Of the first series of 25 samples, which were taken from the upper portion of the Bay where pollution was to be expected, all of the samples showed contamination to a considerable degree. None of the samples gave a score of less than 41. Some of them gave scores of 500.

Of the second series comprising 25 samples from a bed which from the sanitary survey would be classed as in the questionable area the scores ranged from 5 to 320. Six of the samples gave a score of 23 or less. The remaining 19 scoring higher than 32.

In the third series taken from a bed located in the same general region as the former, 23 of the 25 samples gave a score of 32 or higher. The remaining two samples scoring 23. The scores here ranged from 23 to 410.

The fourth series gave exactly the same results in so far as the scores were concerned. The individual content of the oysters, however, was somewhat different.

Series five, which represents oysters taken from a laying much farther down the Bay and which, from the sanitary survey would be judged favorably located, gave a result which was rather disappointing in that but one sample of the 25 gave a score of 23 while the remaining 24 samples scored from 32 to 410.

The sixth series of 25 samples was taken from that bed which, from the sanitary survey, should be the least likely of pollution in that it was the one farthest out to sea and the most distant from any sewerage outlets. This bed gave scores ranging from 2 to 320. Fifteen of the samples scored 23 or less, the remaining 10 being 32 or greater.

Thus it will be seen that in layings which are uniformly bad the part played by chance in the selection of the five oysters is of comparatively little importance. Also in layings which are good, although, unfortunately, I failed to find any, I think it is fair to draw a similar conclusion.

It is in the layings that are intermediate, where there is a wide variation among the individual oysters, that the importance of what oysters are chosen is manifest.

This is perhaps brought out the most clearly in series VI. These oysters were chosen at random and the result was that fifteen samples were comparatively good and ten were bad. If, however, by some power I had been able to choose these oysters with a previous knowledge of their colon content it would have been easily possible to have had all 25 samples score 23 or less. In fact, in this series, mathematically the chances were 2 to 1 that any given sample chosen at random would score less than 32.

Again in series II it is possible that 14 of the samples might have scored less than 32 while in fact only 6 did so. Here the mathematical chance of obtaining a sample at random which would be considered good is 1 in 8. For purposes of comparison I will say that while in series I, two samples scoring 23 could be derived yet the chance of obtaining such a sample is but 1 in 7,500. From a consideration of this work it would appear that in many cases at least the analysis of five oysters may fail to give a correct index of the degree of pollution present in the laying. The only remedy for this that I can see is to use a larger number of oysters for the analysis and perhaps place more weight on the number of bacillus coli present per cubic centimeter in a composite sample of the shell-liquor.

From the examination of my analyses it would appear that the choosing of any number of oysters less than 15 for a sample will not give consistent results.

As conclusions I may suggest,—

That the present method of analysis and scoring may work injustice and does not necessarily give a correct index of contamination.

That the sanitary survey, while undoubtedly of great value, is often misleading.

That a sample composed of five oysters analyzed individually is not sufficient.

That a standard should be adopted based on the number of bacteria of the colon group per cubic centimeter of a mixed sample of the shell liquor of at least fifteen oysters. That is, a standard for oyster-liquor should be established of a nature similar to that in use for water and milk.

In the following table is summarized the data derived from an examination of the work here reported:

THE SIZE OF THE OYSTER SAMPLE NECESSARY TO GIVE AN INDEX OF CONTAMINATION.

Series.	No. of Samples.	Sanitary Survey.	Oysters Showing no Colon.	Oysters Showing B. Coli in			No. of Samples Scoring Under 32	No. of Samples Scoring Above 23	Range of Scores.	Possible No. of Samples to Score Under 32.
				1 c.c.	0.1 c.c.	0.01 c.c.				
I	25	Very bad—Located near large sewage outlet.	0	6	55	64	0	25	40 to 500	2
II	25	Questionable area.	5	33	62	25	6	19	5 to 320	14
III	25	Questionable area.	1	11	59	54	2	23	23 to 410	4
IV	25	Questionable area.	5	13	62	45	2	23	23 to 410	8
V	25	Good.	1	13	69	42	1	24	23 to 410	5
VI	25	Excellent.	22	46	43	14	15	10	2 to 320	25

BOOK REVIEWS

The Reduction of Domestic Flies. *By Edward Halford Ross, M. R. C. S., England, L. R. C. P., London. J. B. Lippincott, Philadephia. John Murray, London, 1913. 103 pages, 13 illustrations, index. $1.50.*

The author is already favorably known by his good work on: " The Reduction of Domestic Mosquitoes " and " The Prevention of Fever on the Suez Canal." His present book is an earnest, moderate statement of the problem of house flies in relation to filth infections with many practical suggestions for its solution. His keynote is the necessity for effective coöperation in keeping all premises clean of filth in which flies may breed. The concluding words of his introductory chapter present his main theses briefly as follows:

" Flies in a town, village, or house should be regarded as a sign of insanitation, and their numbers as a measure of that insanitation. Fly reduction is a beneficial measure.

"1. It means saving of life and therefore of money.

"2. It reduces sickness, sorrow, misery.

"3. It results in a riddance of a pest.

"4. It entails a better sanitary inspection, the discovery of insanitary conditions and places.

" 5. It improves our knowledge of certain diseases.

" 6. Its cost is small.

" Since it is generally agreed that it is the duty of everyone to prevent disease, it is the duty of everyone to prevent, or at all events to reduce, the dangerous domestic flies which produce disease."

Citing the parallel sanitary work with mosquitoes in relation to malaria and yellow fever the author discusses, in Chapter I, the importance of domestic flies. No complete bill of injuries is attempted and few exact figures are given, but many of the best cases —notably those of typhoid in the Boer and Spanish-American wars—are marshaled in convincing popular manner and special emphasis is directed toward illustrating the relation of flies to infantile enteritis. Chapters II and III are devoted to familiar facts of life history from egg to adult and to anatomical equipment and habits of flies in so far as those demonstrate the ways by which flies carry bacteria. Chapter IV discusses the natural enemies of flies, from fowls to fungi, but concludes that man must shoulder the responsibility and himself be their greatest enemy, if he would be free from the pest. From recent newspaper accounts we are led to suppose that fly fungus is on the way, at least, to being effectually utilized in England; but the conclusion here is that even under the most favorable conditions the number of flies so destroyed is small in proportion to those that escape.

In logical sequence, Chapters V to X deal with practical methods of fly reduction and civic organization of the work. The author's position is that the whole matter must be taken on as a reguiar part of the public sanitation of the town, city or district and that when this is done, expense is minimized and at the same time success is assured by having the work in the hands of the properly constituted public authorities. The public must be plainly told why the work is undertaken in the public press and by special posters, where necessary and how it is planned to carry it out. As the author puts it:

" There must be a general and sincere coöperation carried out under the patronage of the local district councils and at the instigation of the local authority. The assistance and sympathy of the local press, the local influential persons, the mayor and corporation, the large property owners, the clergy, the doctors, the schoolmasters, the tradesmen must be gained, and the project will go through with a will. Then it will require little or no increase in the rates—people need not be asked to pay, but to assist by refusing to allow flies to breed on their premises. If everyone does his or her share the cost will be trifling and all difficulties soon overcome. This is the keynote of all sanitary success—general coöperation."

Excellent suggestions are given for making a fly map which shall spot every breeding place, and the plan insists on having the health inspector, who is to be provided with two laborers and a cart, visit every such place once a week and actually see that it is properly cleaned up. Chapter IX discusses "Opposition," which everyone who undertakes such work should read. Ignorance of officials, departmental jealousies, objection of householders to weekly inspections are the main elements here, but if all these can be overcome in Port Said, there should be no difficulty in handling the problem in any civilized community.

The concluding chapter, XII, deals with "Sanitary Education, Flies, and the Coming Generation." "In all schools elementary sanitation should be taught as a routine; and the facts known about flies and their danger to health should be included in the curriculum. Thus the rising generation will learn to limit disease and will grow up educated in some of the methods of saving life."

Excellent as it is, and its many excellent points increases this danger, this book is likely to exert a bad influence on American fly extermination work. We are aiming definitely at extermination. This is readily accomplished by the outdoor trapping methods developed in this country within the last two years. With an animal possessing no more cunning than shot rolling down a board, it is as easy to catch the last pair as the first. Why not let them catch themselves and be done with it? Why leave a single pair in May that can breed up into the billions by September? The author prides himself on his methods of "prevention" which consist solely in removing fly breeding filth from the immediate vicinity of dwellings, but he nowhere gives definite and specific directions for killing the eggs and maggots already developed in the material. This is a very difficult, expensive and laborious matter, and the casual mention of "petroleum" and "chloide of lime" will not accomplish the result. As long as there are flies about, they can and will find something in which to oviposit, even if it be the snuff on a druggist's counter. As a matter of common sense, is it easier to kill a thousand maggots in a cart load of manure or let the fly that lays the eggs walk into a trap? This is the *effective* "*prevention*," and the author decides—properly enough—against trapping adult flies "*in a house*," because he evidently does not know anything about really modern methods of outdoor trapping. Moreover, Mr. Ross is completely hypnotized by his ideas of mosquito reduction and repeatedly insists that flies must be dealt with in the same manner—by attention to the breeding places. But the problems are entirely different. It is easy to drain, fill, oil or stock with fishes the stagnant water in which mosquitoes breed, but difficult, expensive and laborious to effectively deal with the solid organic filth, scattered in pastures, barnyards, gutters, roadsides, public dumps, gardens and fields, and daily renewed in all these places, which may everywhere become the breeding media places of flies. We would command these suggestions to the author's attention in the event of another edition of his book.

C. F. Hodge.

Report of the Philadelphia Baby-Saving Show. *The Child Hygiene Association of Philadelphia. Real Estate Trust Building, Philadelphia. $1.00.*

To one, who, in attendance upon public exhibits, always experiences—like a short-time tourist in Europe—a sense of hurry, confusion, and intellectual dyspepsia, the report of the Philadelphia Baby-Saving Show with its invitation to slow, satisfying perusal comes as a welcome guest.

Admirably arranged and indexed, with a careful description of the various booths and exhibits, a long list of illustrations, and its gift of the combined genius of a host of workers expressed in the terse, epigrammatical placards that accompanied each illustrative object or group of objects, the 270 pages of this report are packed with material of real value to the student of sociology and particularly to the worker in the field of infant welfare.

What has been done once need not be done again. The efficient constructor builds all previously created knowledge and experience and work. The ground covered by the Philadelphia Association in the gathering of data and its popular presentation need never be gone over again. It is a position gained, an experience acquired, an impetus gathered, a collection of facts and ideas admirably set forth and available for all. Undoubtedly much of this excellence is due to a wide use of the experience of previous exhibits. But this careful, detailed, finely-edited report brings this cumulative experience up to date in a more efficient form than has hitherto existed.

And this leads me at the end to the point where Mr. Talcott Williams, in his introduction, began—" If one Baby-Saving Show can do so much in one city, why not have a Baby-Saving Show in every city every year," at least until its lesson has been thoroughly taught—and learned?

Certainly with this compendium of information as a hand book of reference and ideas, the way to such a consummation becomes a much easier road to travel.

Wilbur C. Phillips.

Rural Hygiene. *By Isaac Williams Brewer, M. D. 12 mo. pp. 226. J. B. Lippincott Company, Philadelphia and London. 1909. $1.25.*

Although the interest throughout the country in the movement for good health is constantly increasing, nevertheless good books dealing with the subject of rural hygiene are not numerous. This excellent volume, therefore, should have a wide field of usefulness.

In order that the laws of health may be more generally known and followed, Doctor Brewer has endeavored to apply the principles of sanitation to rural conditions, and in this attempt he has been eminently successful. His book is primarily intended for the general reader, is practical, and is written in plain language. Although personal hygiene is considered to a slight extent, still the greater part of the book deals with the hygiene of the environment or sanitation.

Chapter I treats of work and recreation, of the value of periods of relaxation, and of the value of rural social organizations. In Chapter II the location, construction, and arrangement of dwellings are considered. Chapter III is devoted to school sanitation. In Chapter IV the subject of water supply is discussed. Methods of disposing of excreta and the comparative value of these methods are considered in Chapter V. Considering the relatively few pages devoted to the subject, Chapter VIII gives a very clear, concise presentation of the milk question. The pasteurization of milk is perhaps not favored quite as strongly as the recent trend of opinion would warrant. The last eight chapters are devoted to a consideration of parasites and infectious diseases, the preventive point of view being emphasized. The author's defense of vaccination is commendable. Some of the other chapters deal with such subjects as food, ice, flies, rats, and good roads.

Although a statement is made now and then to which exception might be taken, as, for example, the disinfection of excreta with bichloride of mercury, still the statements made in the book are for the most part reliable and accurate. The book is written in a clear, attractive style, and is thoroughly readable. It is elementary in character, and while it is a book of value for the elementary student of sanitation, it is, on the other hand, more especially valuable and useful for the general reader.

G. E .Harmon, M. D.

HEALTH DEPARTMENT REPORTS AND NOTES.

TO STATE AND MUNICIPAL HEALTH OFFICERS.

This new division of the Journal is specially designed to be of use to active Health Officers of the countries represented in the American Public Health Association. It will be unable to serve its true function unless the Health Officers are willing to coöperate by sending to the Journal copies of their reports, bulletins, new ordinances and personal information which will be of general interest. Furthermore it would be distinctly desirable if communications on subjects of general interest are submitted for publication in this division of the Journal. The management will further welcome any suggestions from Health Officers for the improvement of this division. All communications should be addressed to Selskar M. Gunn, Managing Editor, American Journal of Public Health, 755 Boylston St., Boston, Mass.

REPORTS.

Pittsburgh, Pennsylvania.

The annual report of the Department of Public Health for the year ending January 31, 1912 is a large volume, 452 pages. The total number of deaths reported was 8,105, a decrease of 1,494 as compared with previous years. The death rate per thousand was 14.7, the lowest reported death rate in the history of the city. There were 786 cases and 140 deaths from typhoid fever. The typhoid fever death rate for that portion of the city which is receiving filtered water was 11.2 per 100,000 and for that portion receiving unfiltered, 45.1. The portion of the city having unfiltered water, although approximately only one fourth of the population, contributed 57 per cent of the deaths from typhoid fever. There was a decrease of 619 deaths from pneumonia. The importance of hospital care for advanced cases of tuberculosis is emphasized by Doctor J. F. Edwards, Superintendent of the Bureau of Infectious Diseases. The infant mortality rate, 116 per thousand births, was low as compared with previous years. There were 166 less deaths from diarrheal diseases under one year of age than in the previous year. This improvement is attrtibuted to the work done through the milk stations and to improvement in the city milk supply. Of the deaths under one year, 25 per cent took place in the first week of life and 39.8 per cent in the first month.

The vital statistics are given in very considerable detail. The Division of Laboratory made 52,690 examinations of various kinds during the year. The report of Doctor H. B. Burns, Chief of the Division of Medical School Inspection, is very full. The various forms used by this department in its work are reproduced and should be of interest to health officers. A statement with regard to the infant welfare work performed by this division is included.

Four thousand, two hundred and seventy-four privy vaults were abolished and 5,209 water-closets installed. The report of the Division of Smoke Inspection is unusually complete and contains many illustrations of devices for machine-firing and smokeless stoking. This section of the report will be particularly valuable to health officers who are beginning to undertake the abatement of the smoke nuisance.

The total expenditure for the year amounted to $626,013.

Montclair, New Jersey.

Three hundred and fifteen deaths were reported in Montclair, giving a death rate of 9.83 per thousand. In only two other years since death returns have been recorded has the death rate fallen below 10.

Mr. C. H. Wells, the Health Officer gives an interesting discussion of the death rate with special reference to age distribution, color and nationality. The percentage of deaths of persons over forty-five years during the period 1909–1912 was 50.7; during the period 1880–1894 it was 30.8 The death rate per thousand inhabitants of all the communicable diseases, including pneumonia and tuberculosis, was 1.9, and the case rate was also very low. There were 46 deaths under one year of age. Seventeen of these were due to diarrhea. Mr. Wells states that the milk supply of the town has been given the usual careful attention and the results given in the report certainly bear witness to the admirable work being done.

Special reference is made to the mosquito reduction work which has been carried on. Six full time inspectors were put on this work. Every yard, lot, field, swamp, and woodland was inspected for standing water and property owners were fined for failing to do away with water in which mosquito larvae were breeding. Over 800 mosquito breeding nuisances were abated at a cost of $2,472, and Mr. Wells states that the results of the work were apparent to any citizen who has spent the last few summers in Montclair.

A nurse was engaged to visit cases of tuberculosis and also to do educational work in infant mortality. The total expenditures for the department were $10,492.55. The financial statement is given in great detail and might well serve as a model for other cities.

Nashville, Tennessee.

The efficiency of the Department of Health of Nashville was increased during 1912 through the formation of various bureaus to conduct the different operations of the department. Special emphasis has been laid to the work of prevention of infant mortality. The Health Officer, Doctor William E. Hibbett, emphasizes the importance of measles and whooping cough. Two hundred and twenty-two cases of typhoid fever were reported (including 35 non-residents brought to Nashville for treatment). In no case was the disease traced to the city water supply or to milk. Doctor Hibbett states in this connection that the greatest problem is in extending the city water supply, closing wells and springs, extending the sewers, eliminating surface closets, proper screening against flies, and educating the public.

The population is estimated at 115,950, of whom 38,383 are colored. The white death rate was 14.37 and that of the colored 27.51, while the combined death rate was 18.73. There were 218 deaths from tuberculosis, 96 white and 122 colored. There was only 1 death from scarlet fever, 7 from diphtheria, and 41 from whooping cough.

The bacteriologist reports having made 3,183 bacteriological examinations of milk, 1,610 showed less than 100,000 per c.c., 1,545 over 100,000 per c.c. and only 8 over 500,000 per c.c.

The report does not contain any financial statement.

Norristown, Pennsylvania.

The report of the Board of Health of Norristown for 1912 states that the death rate was 14.1 per 1,000. The population was approximately 30,000. An epidemic of Typhoid Fever occurred which the Board of Health is convinced was due to the use of infected water on a dairy farm. The epidemiological data, however, is not given convincingly.

The table of death statistics is alphabetically arranged and is very unsatisfactory. For example we find Consumption caused 1 death, Phthisis Pulmonalis 2, Pulmonary Tuberculosis, 8, Tuberculosis of the Lungs 7 and Tuberculosis Pulmonalis 1. There is no financial statement given.

DEPARTMENT NOTES.

Importance of Publicity.

"At a recent meeting at Jacksonville the Southern Medical Association, composed of leading physicians from almost every Southern State, considered the best means for rousing the public to a realization of the vital importance of general education in matters of public health. To this end they adopted the following resolutions, presented by Dr. A. W. Freeman, of Richmond:

" 'Whereas, The good health of the people is the most valuable asset of the nation; and

" 'Whereas, it is the highest privilege and duty of the public press to instruct the people in all matters pertaining to public welfare;

" '*Resolved by the Southern Medical Association in regular meeting assembled,* That the newspaper press of both city and country is earnestly requested by the officers and members to coöperate with the Association in its efforts to educate the people in matters of hygiene and sanitation, to the end that thousands of valuable lives may every year be protected from disease and saved from untimely death.

" '*Resolved,* That editors of newspapers and other periodicals published in the South, whether in town or country are urged to join this crusade against the foes of health, happiness and prosperity by publishing gratuitously such articles and documents as will, in their opinion, advance the cause, and by the still more effectual means of editorial advocacy.

" '*Resolved,* That these resolutions be spread upon the minutes and that a copy thereof be mailed by the Secretary to every newspaper, magazine or other periodical within the geographical boundaries defining the limits of eligibility to membership in this Association.' "

Commenting upon the resolutions, *The Southern Medical Journal* proposes the following plans for the future:

" The next step should be the introduction of this subject for discussion before every county medical society in the South. Each society should appoint certain of its members to write a communication to the county paper once a week, the members taking turns at the work and keeping the subject before the people for several successive weeks. This will remove from individual members all suspicion of self-advertising and at the same time afford them an opportunity to show the stuff they are made of. Where there are daily papers the Sunday editions should be chosen."

Working on Commission.

"What would you think of doing health work on commission? Well, that is really what North Carolina is doing. In 1911 about $325,000 worth of human lives were saved by health work. For this the State paid $22,500. In other words, it was done on a seven per cent. commission.

"In 1912, the health machinery got to working a little better, and as a result no less than $5,000,000 worth of human lives were saved on this same appropriation of $22,500. In other words, life saving in 1912 was done a little less than a half per cent. commission.

"About the time some of these facts became known certain legislators who didn't have anything but sense began to wake up to the fact that **health work pays,** and in order to make it pay a little better, and in order to find out exactly what it did pay, they managed to secure an additional appropriation of $8,500 for health work, and $10,000 for the enforcement of a vital statistics law. The year 1914 will show us exactly where we stand with reference to death rates all over the State, and after that we shall be able to know just what is or is not being done to reduce these death rates. Then perhaps there will be some more life saving done on a commission basis."

Bulletin, North Carolina State Board of Health, March 17, 1913.

A New Argument Against Weeds.

"A lady physician has contributed a new idea about noxious germs. In a recent popular magazine she informs her readers that germs collect in large quantities on the weeds which grow around a dwelling house, and that as soon as the weeds decay from any cause the winds promptly pass these germs into the lungs of the inmates of the house, with very serious result.

"The remedy is to pour scalding hot lye on the weed.

"Just why germs should collect upon weeds rather than upon flowers or other wholesome plants does not appear in this philosophy. It is not likely that this authority would recommend the destruction of all vegetation which might grow around the dwelling house.

"The foregoing furnishes a sad illustration of what is being dispensed to the lay public as scientific knowledge."

Journal of the Medical Society of New Jersey.

Healthier Cities.

"A comparison of death rates between city and country in the United States shows that cities have decidedly forged ahead in their precautions against disease, while the rural communities have stood still. Some of our great cities and many of our smaller ones show a lower death rate than the average for the entire country, and much lower than many average rural districts. This is all the more astonishing and significant, considering the many handicaps borne by the cities as compared with the country towns, such as the influx of immigrants, congested tenement districts, the dust and black smoke evils, the exposure to contagion, the danger from adulterated food, and the like. The chief reason for the gain of the cities is probably to be found in their general adoption of advanced methods of sanitation; while, on the other hand, our rural neighbors display, as a rule, a tenacious indifference to this subject. If this reproach were not true it would be impossible to explain why, in spite of the pure air and food which dwellers on farms and in the smaller villages enjoy, the death rate in the country districts remains so large, relatively speaking."

Buffalo Sanitary Bulletin, May 31, 1913.

New Division of Infectious Diseases.

"For a number of years the supervision exercised by the Department of Health over scarlet fever, diphtheria, measles and other contagious diseases of serious importance was conducted through the Division of Contagious Diseases. When, however, in 1905, the Department decided to exercise a more thorough control over tuberculosis, a new division, styled the Division of Communicable Diseases, was organized, and to this was later assigned the supervision of typhoid fever, venereal diseases and some others of communicable nature. It will thus be seen that for several years work quite similar in character was performed by two divisions, and it was finally decided at the meeting of the Board of Health held March 25 to combine them and thus create a new division, to be known as that of infectious diseases. At a meeting of the Board of Health of the Department of Health, held May 6, 1913, a resolution was adopted in accordance with that of March 25, establishing a Division of Infectious Diseases and detailing Dr. John S. Billings as Director of the new division, and on May 21 an executive order of the Commissioner defined the duties of the officials and employees of the new division."

Weekly Bulletin, New York City Department of Health, June 14, 1913.

For Growing Generations.

"Medical school inspection is one of the most profitable investments of any community. Many consider that detecting communicable diseases and excluding such from school is the principal function of this inspection; but in reality it is only one of them. Reference to the annual report will indicate how this work has grown in Buffalo. The physical examination of children, whereby defects are discovered and corrected, is alone the greatest help possible to give the growing generation. Add to this the many instructions on personal hygiene given by the medical inspectors and school nurses, and there is sown a fund of knowledge in minds where it will not only benefit the present but also the future.

"Since January 1st, the psychological division of this Bureau has made about 130 psychological examinations, most of them in the public schools and the Detention Home.

There is an increasing interest on the part of parents and teachers in the subject of mental diagnosis, and the services of our Examiners are in constant demand for the purpose of estimating the probable degree of mentality of backward and delinquent children. This is a very encouraging sign, because it shows that people are seeking for the fundamental conditions of backwardness and irregularity. When they discover these conditions they will want to apply radical remedies and preventive measures, without which there can be no permanent diminution of the number of mentally defective men and women.

"Many good people are sentimental but not sensible in their way of regarding mental defect. They talk about the stigma of mental deficiency as if sub-normal mentality were a moral crime—something to be ashamed of. This is a foolish and costly mistake. Inferior mentality should not be a disgrace to child or parents because it is usually a defect unforeseen and unavoidable—not like bow-legs or deafness or pediculosis, all of which might usually be prevented, or cured by intelligent care of the child.

"One whose mind is defective has the same right to examination and expert care as one whose lungs or kidneys are diseased. This Department, through its Examiners and consulting staff, offers its services for the diagnosis of mental defects and the recommendation of proper treatment. No sane person, whether parent or friend, has any right to stand in the way and prevent help from coming to a mentally defective person under the foolish delusion that he is protecting a weak and helpless victim. Bring the unfortunate defective into the light."

Buffalo Sanitary Bulletin, May 31, 1913.

Scarlet-Fever Pointers.

The following excellent "pointers" regarding scarlet-fever—points that should be brought to the attention of the laity—are reprinted from the *Bulletin* of the Chicago Department of Health.

"Scarlet-fever is a highly contagious disease.

"It is one of the most dreaded diseases of childhood—chiefly beacuse of its after-effects.

"The common after-effects are inflammation of the kidneys (nephritis), heart disease, ear, gland and joint affections.

"It varies greatly in severity; the severest type can be contracted from the mildest.

"Sore throat and vomiting are early symptoms.

"The scarlet rash appears in twelve to twenty-four hours after fever; first on the upper part of the chest.

"A child with a sore throat must be regarded with suspicion—the trouble may be either scarlet-fever or diphtheria. Keep such a child out of school and away from well children until a positive diagnosis has been made.

"The mild case is a greater menace to the community than the severe. It frequently passes unrecognized and is not properly isolated.

"It is the height of folly to expose your child to a mild case hoping that it also may have a mild case and 'get over with it.' As stated before, the severest type of the disease may follow exposure to the mildest.

"A scarlet-fever patient must be isolated for a period of five to eight weeks, depending on cessation of infectious discharges.

"Well children living in an infected home must stay away from school, including Sunday school; in fact, they must remain at home, away from other children of the neighborhood, until released by the Health Department.

"All cases or suspected cases must be reported to the Health Department promptly and infected premises must be placarded, the red warning card appearing at front and rear entrances.

"A scarlet-fever patient must not be removed without the consent of the Commissioner of Health.

"Disinfection will be performed by the Health Department, free of charge. The common practice of burning sulphur candles does no good.

"A scarlet-fever funeral must be held within thirty-six hours after death, and must be private.

"When scarlet-fever is prevalent in a community, keep your child out of street-cars; out of theaters or other places where children assemble in considerable numbers; out of neighbors' houses; away from ailing children, especially those with sore throats or rashes.

"The disease usually develops in from two to seven days after exposure."

Making Babies Immune to Tuberculosis.

"An interesting experiment for the purpose of creating immunity against tuberculosis is being tried in Pittsburgh under the direction of the Tuberculosis League of that city. Dr. William Charles White, Medical Director of the League, says it will probably take ten years before definite results of the work will be appreciated. The experiment is being conducted on the theory that much, if not all, tuberculosis infection begins in childhood. In view of this fact, the League is aiming to supervise the growth of every baby born for the next ten years in the South Side district of Pittsburgh. The babies and their mothers will be taken in charge at the birth of the infant, and everything possible will be done to increase the resisting power of the child to disease and to make it thereby immune to tuberculous infection. The theory is that by fortifying the body in the earliest period of a child's life, the infant will in most cases, become immune to the disease with which heredity and environment may threaten it."

Bulletin, Chicago School of Sanitary Instruction, Department of Health, June 14, 1913.

Insanitary Public Conveyances.

"The probability that infectious diseases are often contracted in public conveyances is referred to by Dr. E. G. Gibbs-Smith, M. O. H., in his annual report to the Teddington Urban District Council. He urges the necessity for keeping all such vehicles as clean as possible, and continues: 'Many railway companies lack a great deal in this direction, and I would call their attention to the very insanitary condition of many of the carriages. That compartments are most inadequately cleaned is often evident both by the amount of dust that can be so easily got out of the seats and backs, and also by the condition of the floors. I have on more than one occasion recently seen compartments of carriages in such a dirty state that I would not get into them.' Dr. Gibbs-Smith advises that all public conveyances should be frequently cleaned with a vacuum cleaner and disinfected."

The Medical Officer, June 14, 1913.

Health Train to Tour State of Michigan.

"Arrangements have been made for a State Health Train under the personal direction of Dr. Robert L. Dixon of the State Board of Health, to leave Lansing, August 4, for a tour of the entire lower peninsula. The train will contain at least three exhibit coaches, and pictures, charts and models will be shown and demonstrations will be made, teaching the principles of disease prevention and setting forth the importance of good health."

J. A. M. A., June 21.

Save the Babies.

"The Modified Milk Station conducted under the supervision of the Health Department is to be opened July 1, 1913. The good results obtained during the past four years by dispensing a certified milk, scientifically prepared, with instructions to the mothers how to feed and care for the infant, assures success for the coming season and is ample justification for the expenditure of municipal funds for such a purpose.

"The old fallacy that health boards were maintained for the purpose of abating nuisances and caring for disease when such things were in actual existence is now rightfully supplanted with the sound doctrine that economical and successful health work is best exemplified through modern preventive measures; appreciating this, physicians are anxiously awaiting the opening of the Milk Station. Knowing that many a little life has been sacrificed during the warm months by improper feeding and care, all feedings are delivered on a doctor's prescription, so that each may get the food which is best suited to its needs.

"The appreciation in which our physicians hold the station and the milk we furnish their patients is best evidenced by the fact that during the sixty-two (62) days the station was open last year we dispensed a total of 35,863 feedings."

Bulletin Division of Public Health, Salem, Mass., May, 1913.

Inspection as Education.

At a meeting of the Southern Medical Association Dr. Oscar Dowling, State Health Officer of Louisiana read an excellent paper on "Sanitary Inspection—Remedial and Constructive" from which the following fragments are clipped:

"Inspection is not only remedial in effect; it is primarily educational. Practically these two elements are one; logically they are separate.

"Giving opportunity as it does for specific instruction on the subjects uppermost in the mind of the individual, inspection is an ideal mode of teaching. It touches a vital interest, with many the dominant interest of life—the business of making a living. In addition, the health officer is armed with the authority which compels obedience to his instructions. This makes the application of the principle a further training, and proves to the individual the usefulness of the knowledge imparted."

"By whatever name the inspector may be known, he is looked upon by many as himself a 'nuisance.' He exposes insanitary places and things which have been considered good enough for generations, and worst of all he insists on changes of a radical nature. It may be true that these improvements are in the interest of all citizens, but that doesn't 'pay' for the trouble involved. Too often the sanitary inspector is looked upon merely as a foreman scavenger, a subordinate of the Medical Inspector. His part in the prevention of everything that will advance disease and retard the preservation of life is unknown, or unappreciated, by the majority, even by some who are members of local and state boards of health.

"But this estimate is passing. The work of inspection is being recognized as of fundamental importance in the collection of facts which give a basis for the proper arrest of causes underlying the public's moral and physical health. Every branch of health activities, whether statistical, analytical or epidemiological, depends on the material gathered by this officer. The chemist and bacteriologist of the department, likewise, need his data for their conclusions; in fact, all researches in every field of sanitary science are dependent, more or less, on the facts gathered at first hand.

"Intrinscially, inspection as a measure can be made the most useful agent of the health department in reducing to a definite surety many problems which have been hitherto complex and doubtful. But, let me repeat, the application must be made with a due sense of justice and a right notion of the scientific principle involved."

Recurrent Typhoid Carriers.

Schumacher in a recent number of the *Deutsche Medizinische Wochenschrift* discusses the probability of infection from individuals who have apparently recovered from typhoid and have been discharged as bacteriologically free from typhoid bacilli. The author has followed up several of these persons and finds that in many cases, presumptively free after the final examination, typhoid bacilli reappear in the urine and persist there for a number of weeks, although the cases cannot be considered as chronic carriers in the ordinary sense of the word. As a remedy he suggests the segregation and sanitary control of all convalescents for at least six weeks after defervescence.

PUBLIC HEALTH NOTES.

Examinations of Laryngeal Smears for Tubercle Bacilli.

The following preliminary report with regard to the examination of laryngeal smears for tubercle bacilli by Dr. Samuel Friedman, appears in *Communicable News* for April 15, 1913:

"As suggested by the experience of Holt, who claims to have found tubercle bacilli in 80 per cent. of the specimens of muco-pus obtained from the larynx of infants in hospitals from whom no sputum was obtainable, it was recommended to the Chief of Division that this method be given a trial at the Harlem Italian Clinic. This met with his approval and arrangements were made with the Diagnosis Laboratory for the examination of specimens. At first, specimens were obtained after tickling the pharynx and thus inciting the patient to cough on a small square of gauze. This gauze was forwarded in a sputum bottle. On account of rapid drying, this method was soon proven impracticable. At present, a long curved laryngeal applicator, wrapped with sterile cotton or gauze is introduced into the larynx and the secretion thus obtained is spread on a microscopic slide, dried in the air, and forwarded in the wooden mailing case provided by the Laboratory.

"Since January 8, 1913, thirty-one specimens have been examined from thirty-one cases. Seven were positive and twenty-four negative. Twenty-three were from children under sixteen years of age, of which five were positive. The remaining eight from adults having no cough or expectoration gave two positive results.

"With improvement in technique and further study of patients, it is hoped that a valuable aid in diagnosis may be made available in clinic cases where sputum cannot be obtained."

Results of Rehousing in Liverpool.

" The result of rehousing in Liverpool is an encouraging proof that a great city faced with a serious slum problem and all its attendant evils can accomplish much by means of a vigorous policy. Liverpool's figures up to December 31, 1912, are eloquent:

Total number of sanitary dwellings erected	2,663
Erected prior to 1897	629
Erected since 1901	2,034

(These dwellings are for the laboring classes and are reserved for the dishoused.)

SOME RESULTS.

Death rate—Declined from 50 to 27 per 1,000.

Tuberculosis—Declined from 4 to 1.9 per 1,000.

Typhus fever—Once never absent; in 1910 not a case.

Typhoid—In 1896, 1,300 cases; in 1911, 200 cases.

Police prosecutions—Have fallen 50 per cent.

Cash saving to city—At least $325,000 per year, or double the cost of the rehousing work."

The American City, April, 1913.

One Cent a Day for Health.

"Every one has been interested in the wonderful work being done in Panama in the construction of the canal. Startling as have been the results of the work of the engineers and builders, the work of the Sanitary Department has been even more wonderful. In a region noted as the most unhealthful in the world, in which our predecessors, the French, were unable to succeed because they could not keep the workers alive, American Army surgeons, by the use of scientific facts known to all, have succeeded in lowering the death rate among American residents far below that of our most favored American communities. According to Colonel Gorgas, the chief sanitary officer of the Canal Zone, who recently discussed this question in the *Journal of the American Medical Association*, the death rate for 1911 among 10,489 Americans was only 4.48 per thousand. While this result has been mainly due to the control of yellow fever and malaria, and while it is true that the American population consisted of picked individuals, largely of educated men and women in the prime of life, yet even with all these conditions recognized, the record is a remarkable one, and is probably without a rival. And all this, says Colonel Gorgas, has been accomplished at an expense averaging one cent per day for each individual. If this result can be secured at this cost in the center of a tropical jungle, what would not a similar expenditure do for our American cities? One cent a day is what the average American pays for a daily newspaper. It is one-fifth the cost of one five-cent cigar. It is one-fifth the price of a daily street-car ride. It is one-fifth the cost of admission to a moving-picture show. It is one-fifth of what we pay for a glass of soda water or a package of chewing gum. Who would say that the expenditure of this amount would be any burden to this rich and extravagant nation? And yet it is the cost of life itself. Is one cent a day too much to pay to protect the life and health of an American citizen?"

Journal of the American Medical Association, April 5, 1913.

Atmospheric Pollution.

"The committee formed last year, with Dr. W. N. Shaw, F.R.S., head of the Meteorological Office, as chairman, to promote the investigation of the amount and character of atmospheric pollution at different centers of population and industry, has recently issued a circular letter to all the local authorities in the United Kingdom asking for their coöperation in its work, and it has also formulated a scheme for a systematic investigation of the suspended solid impurities of the atmosphere. A standard type of apparatus has been designed for carrying out the investigations. Preliminary experiments made in London and Leeds in the years 1910–1911 with the method of observation recommended by the committee have proved that the soot and dust-fall in these typical great centers of population and industry amounts to the astonishing totals of between 300 and 650 tons per square mile per annum, the highest downfall of soot and dust being obtained in the East End of London, where a total of 650 tons per square mile per annum was recorded. In Glasgow the total was 1,331 tons and in Coatbridge, 1,939 tons. The London committee will commence, in October, the work of compiling further exact records of the soot and dust-fall in various towns and cities."

The Medical Officer, April 26, 1913.

Syphilis and the Law.

"The Medical Society of the Borough of the Bronx, founded in 1891 and numbering nearly two hundred members, is much displeased with an order of the Board of Health requiring the registration by hospitals of persons under their care suffering from venereal diseases, and has passed the following resolutions:

"'The above-named society, by unanimous vote at a regular monthly meeting, protests against the recent direction and order of the Health Department to certain hospitals in the city, requiring such institutions to record in the said Health Department the names and addresses of all patients suffering from venereal diseases, and, if possible, the names and addresses of all persons supposed to be sources of infection, and such protest is made for the following reasons:

"'1. Justly or unjustly, venereal diseases are regarded as a reproach and stigma, yet from 10 to 30 per cent. of such cases are innocently acquired.

"'2. All knowledge of such cases obtained through professional media is confidential and privileged, and should not be recorded even in such private practice, except as records of disease.

"'3. To continue reporting such cases under this order will cause blackmail and divorce suits, ravaging homes and means of livelihood and leading to private vengeance. The protection of such records in the Health Department will be impossible.

"'4. Statistics will not be improved to any appreciable extent by such reporting.

"'5. Further, all diagnosis in such cases are not always correct. Time alone proves such mistakes.

" '6. Still further, to argue that the public health and morals will be promoted by the making of such records is to argue that all the information of the lawyer's office and of the confessional shall be turned over to the district attorney or grand jury.

" 'This is an era of agitation for government. The tendency to provide for the treatment of disease in part or whole by the state or municipality, we deplore, though fully understanding that our position will be criticized as prejudiced in favor of our pockets. We yet hold to the sanctity of the rights of the individual. This society loyally supports the Health Department in its highly important work of sanitation and prevention, yet maintains that the greatest good of the people lies in the hand of the physician, who depends not on salary, but on what he is paid by his patients, studies their needs, knows their hopes and fears, and counsels and advises them in many matters other than medical, yet vitally important to their physical and moral welfare. Many of the poor we care for in our offices, yet such 'are always with us'; some hospitals must exist, and our protest is for the protection of the sacred rights of such unfortunates.

" 'The final argument in favor of this order is the prevention of venereal disease in the virgin bride. Such prevention will not result, for the poor man will either go untreated or treat himself, or antagonized against organized medicine in the form of a city hospital, will get together enough money for insufficient care by the advertising quack, and later, because not cured, do the deadly work of spreading his disease.'

"We welcome discussion on this question. It is a question whether people are not slowly approaching a tendency of mind where venereal disease is not looked at from a moral standpoint, but from the standpoint of any other disease, as measles or scarlet fever. The recording of such diseases is considered necessary for the common good. The time will come when the registration of all transmissible diseases will be considered necessary. The public may as yet not be educated up to the recent order of the Health Department, but that it will be soon there is no doubt."

The Dietetic and Hygienic Gazette, May, 1913.

Philadelphia's Vice Problem.

"A unanimous report submitted last month by the Mayor's vice commission places Philadelphia in the ranks of Chicago, New York and those other large cities which are endeavoring to remedy their moral conditions. The commission confirms the findings of other students, who recommend that sex hygiene and pathology be taught in the schools and that health certificates be required for the issuance of marriage licenses. Among its other recommendations are:

"That segregation and all efforts to continue that practice here be abandoned.

"All measures of suppression to be freed from the spectacular.

"That prosecutions for the suppression of the evil in the future be directed first against the owners of the houses.

"That the Department of Health be empowered to supervise the registration of diseases.

"That a night court be established and a court committee be appointed to look after these cases.

"Social service departments in all establishments where men and women are employed together.

"Appointment of women to the police force.

"Appointment of women to all institutional boards by which women or children are treated for correction.

"Strict supervision of places of amusement.

"Strict supervision of employment agencies.

"Better police supervision of Fairmount Park, which is characterized as one of the most pernicious places for the teaching of immorality.

"Enactment by the Legislature of laws regulating registration of social diseases, letting of houses for immoral purposes, punishment of street women, and the sale of habit-forming drugs.

"That the Legislature raise the age limit of consent to twenty-one years; that it establish a state reformatory for women, and that a law be passed excluding messenger boys from immoral resorts."

The American City, May, 1913.

The Decline of Tuberculosis.

In the course of an address on the decline in the tuberculosis death rate, read before the National Association for the Study and Prevention of Tuberculosis, at Washington, D. C., on May 8, Mr. Frederick L. Hoffman, statistician of the Prudential Insurance Company of America, said in part as follows:

"All the available evidence sustains the important conclusion that the mortality from tuberculosis of the lungs in the United States has been substantially and persistently reduced during recent years. Considering the last decade only, there has been an approximate reduction of about 200,000 in the number of deaths from tuberculosis of the lungs which would have occurred if the earlier and excessive death rate from this disease had continued to prevail. In consideration of the suggestive fact that the average age at death in tuberculosis of the lungs is only thirty-six years, it is evident that such a reduction in the mortality must be of the greatest possible economic importance. Combining the mortality from this disease for our large American cities, which in 1911 had an aggregate population of about 19,500,000, it is shown, on the basis of trustworthy official statistics, that there has been a reduction in the death rate from tuberculosis of the lungs from 355 per 100,000 of population in 1881 to 166 in 1911, or 53.2 per cent. This is a most gratifying reduction, and all the other evidence available for the registration area of the United States sustains the conclusion that a substantial reduction has taken place in the tuberculosis death rate throughout the country as a whole.

"In the three states of Massachusetts, Rhode Island and Connecticut combined, and for which the information is most complete, the male death rate from tuberculosis of the lungs has decreased from 276 per 100,000 of population in 1881 to 146 in 1911 or 47 per cent. The corresponding decrease in the female death rate in these three states has been from 308 to 211, or 64 per cent. The lesser decrease in the tuberculosis death rate of males suggests the need of further improvements, particularly in labor conditions, which are more or less responsible for the excess in the male death rate from this disease. This conclusion applies particularly to the so-called dusty trades, which seriously predispose to tuberculosis and to non-tubercular respiratory diseases.

"For the three cities of New York, Philadelphia and Boston, there is an unbroken record of mortality available for an entire century, beginning with 1812 and ending with 1911. According to this record, which is illustrated by a chart, there was no decided tendency towards a persistent and material reduction in the tuberculosis death rate until 1882. Since that year, which is the most memorable one in the history of tuberculosis, there has been a persistent downward tendency in the tuberculosis death rate of the three cities, or, to be precise, the rate has diminished from 389 per 100,000 of population in 1881 to 180 in 1912. The rate for 1912 is the lowest on record for these three cities, for which the information is as trustworthy as for any other section of the world.

"The foregoing facts and conclusions emphatically contradict recent assertions from responsible sources that the nation-wide campaign against tuberculosis had been practically barren of results. The facts, to the contrary, are the strongest possible endorsement of what has been done, and is being done, through associated effort throughout the country to gradually reduce the mortality from this preventable disease, and the experience of the past justifies the hope that much more will be done in the future, though this will require even more strenuous efforts than have been made in former years. It is to be hoped that the public will not be misled by irresponsible utterances but accept the evidence as derived from official sources, and all of which unmistakably sustains the conviction that what has been done in the field of prevention, and particularly by associated effort, has been well done and is therefore deserving of continued and increased public appreciation and support."

New Cause Suggested for Pellagra.

"Two Washington investigators, Jennings and King, as the result of careful investigations which show the improbability of sandfly and other insects (flea, louse, bedbug, mosquito) being effective in the transmission of pellagra, give some reasons for believing that the blood-sucking stable fly may be the insect that is the agent of transmission. To quote: 'In most places it is abundant, even excessively numerous, and is closely associated with man and his domestic animals, breeding about his outbuildings, frequenting the vicinity of his dwellings, and even entering them sometimes in considerable numbers. Although it prefers to attack domestic animals, it readily bites man with frequency, but with some irregularity, depending apparently upon meteriological conditions and immediate availability of its normal prey.'

"As a reason why the southern towns are not exempt from the ravages of pellagra, they say: 'The majority of the cities and towns of this region are, from the point of view of *Stomoxys* (stable fly) propagation and distribution, rural communities in that they offer facilities for both these functions which are not inferior to those existing in the country districts. The densely built-up business sections are of small area when compared with the spaciously planned residential districts in which houses are surrounded by lawns and grounds of greater or less extent; and the keeping of domestic animals, principally horses and cows, is almost universal. The breeding of these flies takes place not only about the private stables referred to, but in and about the public stables and wagon yards in business sections. As a result, the stable fly is to be found in all parts of such towns, and in the small ones it is numerous everywhere.'

"It is in such towns that pellagra occurs endemically, or in other words, it is always present. The fact that the women are more frequently around the horses and that they usually milk the cows, would explain why they are more likely to be bitten by these flies, and as a result, why there are more women than men victims of pellagra."

Life and Health, April, 1913.

Inhalation of Dust, and Tuberculosis of the Lungs.

"On exposing normal guinea pigs to the inhalation of various kinds of dust Cesa Bianchi found that more or less inflammation of the bronchial mucous membrane and enlargement of the peribronchial lymph-nodes would result, but that otherwise the conditions in the exposed were quite like those in normal animals. When guinea pigs exposed to dust were infected with tubercle bacilli, however, they almost without exception perished from tuberculosis, the process running a much more rapid course, and the pulmonary involvement being much more pronounced in the exposed animals than in the control animals. The results did not seem to be modified by different kinds of dust. There developed in some of the animals an extensive cavity formation in various parts of the lungs, especially in those in which the tubercle bacilli were introduced through the air passages. It appears then that inhalation of dust in the guinea pig reduces the resistance of the lung tissue to tubercle bacilli so that it becomes a more favorable soil for their development. It is well known that in normal guinea pigs it is difficult to produce a tuberculosis which is predominatingly localized in the lungs; in animals exposed to dust, however, this seems to take place readily, especially when the infection is introduced by way of the respiratory passages. These results corroborate the results of clinical experience and statistical study to the effect that the inhalation of dust of various kinds is harmful and favors directly the development of pulmonary tuberculosis."

J. A. M. A., *Journal of the American Medical Association.*

Efficient Midwives and Infant Mortality.

"Since the commencement of 1906 the infantile mortality during the first fourteen days of life amongst cases attended by certified midwives in East Sussex have been as follows per 1,000 born: 1906, 18.0; 1907, 18.8; 1908, 16.7; 1909, 15.6; 1910, 16.5; 1911, 14.5. Mr. A. G. R. Foulerton, C. M. O., points out that this fall in early infantile mortality coincides with a progressive increase in the proportion of trained midwives amongst those practicing within the local supervising authority's area. He adds that since, apart from prematurity, the chief cause of this early mortality is difficulty in labor, in which medical assistance is urgently needed, it seems probable that the reduction in mortality is due to the ability of the increasing number of trained midwives to recognize, before it is too late, the kind of case in which a medical practitioner should be sent for."

The Medical Officer, April 26, 1913.

The Control of the Smoke Nuisance in New York.

"While New York City on the whole has had less difficulty with the smoke problem than many other American communities, it is nevertheless only at the price of continued vigilance and exercise of the police power that the atmosphere is kept reasonably clear and free from contaminating and unwholesome vapors. While in the modern view the prevention of smoke may not be considered as having a direct and vital relation to the prevention of disease, it has nevertheless become by historical development an important function of the Health Department, for smoke and cinders constitute one of the most annoying of the various kinds of nuisances which the citizen expects the police and health authorities to regulate, and complaints from this source are received and investigated daily.

"For many years the Board of Health, having the power to adopt and enforce local health and nuisance regulations, has sought to preserve the purity of the city's atmosphere by successive amendments of the Sanitary Code in order to obtain practical, workable ordinance, which would stand the test of the courts and under which this nuisance could be effectively suppressed. Contrary to the popular impression, the ordinance does not explicitly prohibit the use of bituminous coal, although the effect has been to make its employment in most instances practically impossible. The ordinance in its present form, section 181 of the Sanitary Code, simply attacks the nuisance as such without regard to its source, and prohibits the discharge of 'dense smoke.'

"The legality of the smoke ordinance has been repeatedly questioned and its form has been changed from time to time in accordance with court decisions. For those who are especially interested in the legal phases of the smoke problem, several of the leading cases which have been adjudicated in local courts are reprinted in this issue."

New York City Health Department, April, 1913.

The Menace of the Feeble-Minded.

"The rapid increase in the number of feeble-minded is appalling. Dr. Henry Goddard, one of the world's authorities on feeble-mindedness, addressing the last State Conference of Charities, said that if the prevailing ratio in other states and countries is applicable to this state, we have not less than 20,000 feeble-minded in our population.

"Racial self preservation demands action. The public must be educated to the dangers of the feeble-minded in the pollution of the racial stream. *Legislation that will segregate them and prevent their procreation is essential.* Preparatory to such legislation there must be laid a broad foundation of public sentiment favorable to it. The recognized facts concerning mental defectiveness are not known to the average man and woman. Some of the conceded causative forces are still the secret of the professional circle. What the feeble-minded cost the state in dollars and cents has not been estimated, but it must be an enormous sum. No accurate compilation has been made of the crime which may justly be laid to the mental inferiority of its perpetrators. The mental defective is a positive, aggressive enemy of society whether it be through a large progeny or criminal activities or both.

"The menace of the feeble-minded has become so terrible that the English Parliament, during the last year, has been making extensive investigations with a view to adopting comprehensive legislation to stamp it out as a plague that threatens the existence of the nation. No subject before that legislative body has received more earnest attention and consideration than the mental deficiency bill and when it finally becomes a law it will probably be a fit example for other countries to follow."

Third Annual Report of the State Charities Commission of Illinois, 1912.

The Moving-Picture Show as a Health Problem.

"The popularity of the moving-picture theater as a form of cheap entertainment for the masses has directed attention to several of its undesirable features. In Chicago it is said that 250,000 persons, a considerable portion of whom are children, attend these theaters daily. Most of the theater buildings are cheap storerooms, remodeled for the purpose, often without adequate provision for ventilation. It is estimated that the air in one of these theaters will pass through the lungs of the audience in from six to eight minutes. They, therefore, constitute as the Chicago *Health Bulletin* remarks, one of the health problems called into existence by modern customs and conditions. In cities all over the country, the problem is practically the same, involving the role of contact or close association in the spread of 'colds' and the various infectious diseases. It is a matter of observation that the incidence of the various infective diseases of childhood immediately increases on the opening of the schools in the fall on account of the increased opportunity for contact between infected and non-infected children. It may, therefore, be reasonably assumed that the close contact in the moving-picture theater is also a factor in the distribution of infectious diseases. Since it is not easy to exclude those who have diseases or who come from homes where disease exists, well-considered regulations as to the ventilation and sanitation should be enforced for the protection of the public."

Journal of the American Medical Association, April 19, 1913.

Governor Sulzer's Ventilation Commission.

Governor Sulzer has recently appointed a commission on ventilation of the state of New York. The commission consists of Professor C.-E. A. Winslow, Chairman, Doctor Edward Lee Thorndike, Doctor James A. Miller, Doctor Frederic S. Lee, Professor Earle B. Phelps, and Mr. D. E. Kimball. The Governor in appointing this commission issued the following statement:

"I am informed that in many instances expensive ventilation systems are lying idle and in many more instances in which they are not idle, the results are unsatisfactory to the teachers, to the pupils and to the Boards of Education, which are operating them. There is nothing in my judgment, which more vitally affects the public health cf the school children of the State, and indirectly the health of all the citizens of the State, than the problem of providing an adequate supply of fresh air under the best conditions.

"The problem is far from simple, however, it is much more than an engineering problem, for the best scientific experts have not determined what conditions should be met by the engineers. Even the most fundamental facts which must lie at the basis of any efforts to ventilate our school buildings, have not been scientifically determined by any experiments which have been made thus far. It is not known, for example, and cannot be known without more adequate experiments than have been possible up to this time, what temperature should be maintained in public school buildings. Indeed, it has not even been proven whether a constant temperature or a varying temperature is more beneficial. We do not know scientifically what degree of humidity should be maintained in our school rooms. . . . .

"The enormous influence of the acquisition of additional scientific facts upon public health movements in recent years has affected measurably the public health of the country. I am convinced that similarly in the field of ventilation, the acquisition of additional and fundamental facts would seem adding enormously to the health of public school children. At any rate, as the health of so many thousands of children, not only in this State, but in other States, would be benefited by any facts which might be demonstrated, and as the expenditure of many thousands of dollars now being expended in ventilating systems could be made much more effective, it seems distinctly worth while to undertake experimental and research work looking toward this end.

"Fortunately through the generosity of a public spirited citizen, Mrs. Elizabeth Milbank Anderson, the sum of $50,000, or such portion thereof as may be needed, has been given to the Social Welfare Department of the Association for Improving the Condition of the Poor, for the purpose of making such an inquiry. At the request of that Association, I have decided to appoint a Commission on Ventilation to direct this important work.

"These men" said the Governor in conclusion, "have signified their willingness to direct this research work without remuneration. The work of an expert Commission of this kind, generously undertaken by men, of recognized ability in their respective fields out of a devotion to the cause of science and the welfare of humanity, constitutes one more example of the splendid self sacrifice and disinterested spirit of the best citizens of the State. The work which they will undertake is a public service of high order and will, I have every reason to believe, result in accomplishing much for the public health of the people in this and other States."

Flood Sanitation.

A very interesting and valuable article, entitled, "Sanitation of Flood-Stricken Towns and Cities" appeared in the June 13, 1913 issue of *Public Health Reports*, from the pen of Dr. L. L. Lumsden. Dr. Lumsden reaches the following conclusions:

"1. Floods such as occurred in the Ohio and Mississippi Valleys in the spring of 1913 occasion sanitary situations of considerable gravity.

"2. The insanitary conditions obtaining in most flood-stricken towns and cities represent in large part merely an accentuation of conditions which were faulty and dangerous before the period of flooding.

"3. Insanitary conditions occasioned by floods in towns or cities which immediately prior to being flooded have had good and complete public water supplies and water-carriage sewerage systems, are, as a rule, readily correctible.

"4. The installation and maintenance of sanitary devices for the proper disposal of human excreta is, as a rule, the most important single measure needed for safeguarding the health of flood-stricken communities.

"5. The treatment of water supplies with hypochlorite of lime is a thoroughly feasible measure, which has a wide range of applicability in flood-stricken towns and cities.

"6. Antityphoid inoculation, though capable of affording a very considerable degree of protection against typhoid infection, does not appear in its present stage of exploitation to be a measure practicable for extensive application in flood-stricken communities.

"7. The work of sanitation precipitated by flood conditions may be, and should be, directed to effect permanent sanitary improvements."

Lack of Beds Creates Emergency.

A pamphlet under the caption "Are We Hitting the Bull's Eye?" edited by John R. Shillady, and published by the Buffalo Association for the Relief and Control of Tuberculosis, has recently been issued. It is facts, figures and opinions given by health officers and experts in tuberculosis work effecting tuberculosis mortality, and the campaign against the disease in cities of 100,000 and over. The study has been made through a series of twenty-one questions, the replies to which constitute the main part of the pamphlet.

The questionaire was largely the outcome of differences of opinion which arose last fall between the committee on municipal development, of the Anti-Tuberculosis Association, and the city officials with the local board of health. The association wished to see if other health officials and experts in tuberculosis work throughout the country would give justification to the assertion made by them to the city officials that the number of advanced cases uncared for in the city constituted an emergency which would justify the health commissioner in making immediate hospital accommodations without advertising for bids. The city officials took a negative view.

The question regarding this situation as submitted to the health officers and experts read: "If you have not sufficient accommodations to care for a considerable percentage of your cases of tuberculosis, would you favor declaring the presence of so many sources of infection in your city an emergency justifying you within the law in quickly supplying hospital accommodations, without the usual red tape and slow procedure?" It is interesting to note that 75 per cent. of the most eminent workers in public health and tuberculosis answered in the affirmative.

The answers to the other questions bring to light the variety of measures advised in order to reduce the tuberculosis death rate. They reveal that beyond sanatorium and hospital treatment which has been the immediate need throughout the country, removal of dusts in trades, alleviation of poor shop and home conditions, use of open air schools, education among the public as to the importance of the disease, giving care to apparently cured cases, and following up those who have been exposed, are a few of the important helpful measures. It is evident from the report that in attending to the more immediate requirements this tremendously important point of examining those who have been exposed to the disease, as a measure of prevention and early cure, has been neglected.

That tuberculosis is the most important disease for a health department to control when regarded from the viewpoint of morbidity, mortality, and economic loss to a city, is the opinion of about 90 per cent. of those who have answered these questions.

Counting Bacteria in Water.

"Donald's method of enumerating bacteria in water, consists in taking a small definite-sized drop of the water, drying it in a circular patch on a slide, fixing effectively the circular film, staining clearly the bacteria present, and counting them under the microscope. The definite size of the drop is determined by the outer circumference of the vertically held clean glass pipet at the level where the drop-surface curving upward and inward joins the outer surface of the pipet point and clings round it. This particular size of pipet gives exactly that definite-sized drop of that liquid only at a particular rate of dropping and a particular temperature. The pipets are guaged to any particular size required in the proper hole of a steel guage plate such as is used for wire. The guage sizes most used in the work done by Donald are as follows, the drop-rate being one per second and the temperature 20 c.:

	Size	Diam. mm.	Corresponding to Drops of Water Each
Morse drill and wire gauge..........	77	0.457	1/101 c.c.
	80	0.34	1/131 c.c.
French draw-pipe....	8	0.29	1/173 c.c.

"The bacteria may be stained before dropping by adding a small quantity of bacteria-free methyl-violet solution and heating for a few minutes in a bath at 60 C. But the drop when dried has so many stain-granules and sharp circular droplets of stain that even an approximate count demands much careful scrutiny and much time."

R. Donald in The Lancet, May 24. *Review from J. A. M. A.,* June 21.

Medical Examinations of Employees.

"Medical Examinations of Employees" giving the results of two years work by Committee on Factories of the Chicago Tuberculosis Institute, is the title of a special bulletin by the Institute issued June 1, 1913. The Bulletin is by Dr. Theodore B. Sacks, who as chairman of the committee on factories has carried on a number of pioneer experiments along the line.

The report discusses briefly the scope and plan of the work and then takes up detailed statements of results by the medical directors of a number of large companies in Chicago. Probably the most interesting of these is the report by Dr. Harry E. Mock on Medical Examination of Employees at Sears, Roebuck and Co., which has been in force for about four years. During this time, out of an average number of over 9,000 employees, 6,800 examinations were made. Of these, 193 were found to be tuberculous. Of this number, 57 were treated in sanatoria, 69 at home, and 53 were sent to the country. At the present time 57 of these are back at work and 24 are still under treatment. Besides these cases of tuberculosis, 40 cases of heart and kidney disease unknown to the patient were discovered, and 200 cases of scarlet fever, measles, chicken-pox, mumps, diphtheria, and syphilis.

A special committee also submits in the bulletin a set of standard specifications for efficient medical examination of employees. These requirements are as follows:

(1) Survey of general development and state of nutrition, including color.

(2) Inspection of mouth and throat.

(3) Inspection and palpation of neck.

(4) Thorough examination of the bare chest. (a) The lungs, with emphasis on search for tuberculosis. (b) The heart.

(5) Hernia, in men only.

(6) Varicose veins of the legs.

(7) Flat foot.

(8) Brief inspection for gross defects, congenital or acquired.

(9) Height and weight.

(10) The pulse.

(11) Vision. (a) Inspection (non-instrumental) of eyes. (b) Snellen's test type.

(12) The kidneys. A chemic urinalysis is considered advisable and should be made, if possible.

(13) History.

Inquiry into personal and family history, with a view of eliciting the existence of tuberculosis, epilepsy and mental diseases, in the past or present, in parents, brothers or sisters.

Ice Commission Formed.

"A recent ruling of the United States Public Health Service has been made demanding that all interstate carriers supply certified water and ice to be used in public drinking fountains, tanks, etc. Under this ruling the various ice and water companies are compelled to obtain certification of their ice and water to be used on steamboats and trains. Accordingly a commission, to be known as the Chicago Ice Commission, has been formed, composed of Drs. Ludwig Hektoen, director of the Memorial Institute for Infectious Diseases, Edwin O. Jordan, professor of bacteriology, University of Chicago, and Prof. John H. Long, professor of physiologic chemistry, Northwestern University, which will undertake the examination of ice, its source, transportation, delivery, etc., and certify the results when found satisfactory." *J. A. M. A.*, June 21.

Venereal Prophylaxis in the Navy.

T. A. Berryhill, in *Long Island Medical Journal*, March, 1913, states that early in the use of prophylaxis there were, in a given period, 1,134 exposures to infection, all of the exposed men taking the prophylactic treatment. Of this entire number in none developed chancroid or syphilis, and in only two gonorrhea developed. The prophylaxis consists in washing of the parts with a one to 2,000 solution of bichloride of mercury, then washing in pure water and the taking of an injection of about two drachms of ten per cent. argyrol or two per cent. protargol, which is to be retained for three minutes by the clock. The penis is then to be smeared with an ointment of fifty per cent. calomel in lanolin. The ointment is to be thoroughly rubbed into all folds of skin around the prepuce and glans and is to be left on. It is believed, on the evidence of results, that the prophylaxis is more effective against syphilis, when given late, than against either gonorrhea or chancroid.

New York Medical Journal, April 12.

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THE YAKIMA SANITARY CAMPAIGN.

BEING A REVIEW OF A YEAR'S WORK AGAINST TYPHOID FEVER IN THE YAKIMA VALLEY AND THE RESULTS ACHIEVED.

Thomas Tetreau, M. D.,
North Yakima, Washington.

Read before the General Sessions, American Public Health Association, Washington, D. C. September, 1912.

North Yakima is the county seat of Yakima county in the state of Washington. It is advantageously situated at a point where several valleys converge near the confluence of the Naches and Yakima rivers about ninety miles from the Columbia River into which the Yakima empties.

Originally a small village known only as a shipping point for cattle, sheep, hay and hops, it has grown in twenty years to be the center of one of the most fertile irrigation sections of the United States acquiring considerable fame as a fruit center.

Today it is a city of about 17,000 population. The surrounding country for several miles in every direction is cut up into small farms of from 5 to 40 acres and the dense rural population has such facilities of transportation and communication with the city as to make it practically suburban. The soil is a light volcanic ash of a varying depth overlaying a loose gravel formation. The ground water level rises and falls as much as 15 or 20 feet with the beginning and cessation of irrigation reaching its highest in August and its lowest about February.

The climate is mild, winters short with little snow, an early spring, a long dry summer and a late fall. The average annual precipitation is frequently less than 7 inches.

Sanitary Conditions.

The water supply is taken from the Naches River into an open canal coursing about 8 miles through irrigated cultivated lands, then through about 12 miles of pipes to the city where it is distributed to about three-fourths of the population. About one-fourth of the people depend upon shallow wells, many of which are dry during the winter months.

A water carriage sewerage system accommodates probably less than three-fourths of the city and the sewage empties into the Yakima River about 3 miles above the intake of two large irrigation canals. The rest of the city has open privies and a few cesspools not water tight but draining directly in the subsoil.

There is an unusually large number of horses and cows housed for the most part in mere sheds or very poorly constructed stables, and a proportionately large number of flies, during the long summer season.

The milk, cream and butter supply is derived from dairies within a radius of thirty miles, shipped in by train from the more distant points and from the nearer farms by wagon.

Four creameries supply ice cream, cream and butter, and three of these also retail and wholesale milk. There are also four retail milk dealers dispensing milk from their own herds while many families are supplied from the neighbor's cow.

There are no factories but during August, September and October thousands of men, women and children gather in temporary camps in nearby rural districts harvesting fruit and hops.

Typhoid Prevalence.

There is no reliable source from which to secure complete data concerning the prevalence of any disease prior to the year 1911.

Dr. Elmer E. Heg, late Commissioner of Health for the state of Washington, reports typhoid fever as of frequent occurrence in North Yakima over twenty years ago.

In 1904 the State Board of Health detailed Dr. Rose A. Bebb to examine and report upon the prevalence of Typhoid Fever in and near North Yakima, her report appearing in the "Fifth Biennial Report of the Washington State Board of Health." In about six months there were investigated 298 cases of which 190 gave positive Widal tests and of these 190, no less than 121 were developed in North Yakima, then a city of about 6,000 people, one case for every 50 persons in the city.

In 1910, Dr. Eugene R. Kelley and Mr. T. R. Wilber of the State Board of Health made another study reporting at length in "Studies in Typhoid Fever by the Washington State Board of Health, 1909–1910." During the last half of June and the entire months of July, August, September and October they observed 163 cases of typhoid fever of which 124 were among residents.

More accurate and complete records are obtainable of the deaths from typhoid in North Yakima beginning with the year 1908. In that year there were 26 deaths from that disease or about 12 per cent. of the deaths from all causes.

In 1909 there were 19 typhoid deaths, about 8 per cent. of all deaths.

In 1910 there were 31 typhoid deaths or over 12 per cent. of all deaths. Bulletin No. 109 of the Bureau of the Census in the "Mortality Statistics for 1910" gives North Yakima a death rate from all causes of 18 per thousand of population, and a typhoid death rate of 237.6 per 100,000.

In May, 1911, a sudden outbreak of typhoid occurred with some 60 cases confined entirely to the eastern part of the city and attracted considerable attention because it was two or three months earlier than the usual time for that disease to appear and because it covered only a small portion of the city while no cases appeared in the western part of the city, which in previous years seemed to be most affected. Three of these cases died.

This outbreak marked the end of a long period of patient submission to an apparently inevitable annual scourge. The immediate outcome was an agitation started and fostered by the medical profession, aided by the business organizations and Women's Clubs and strongly supported by the daily press.

This resulted in bringing together the city, county and state health authorities to confer on the best means of dealing with the outbreak then prevalent as well as with the annual typhoid prevalence in the city and county.

Organization.

Prior to July 1, 1911 there was practically no health organization. Each incorporated town had a health officer appointed annually by the Mayor usually at a ridiculously small salary and with little or no facilities for doing any effective work. The county health officer appointed biennially looked after sanitary matters in the unincorporated parts of the county, and had nominal jurisdiction over all local health officers. He also had charge of all indigent sick.

It was decided to appoint one health officer for the City of North Yakima and for Yakima county at a salary sufficient to enable him to devote his entire time to matters of public health. A laboratory was equipped, a bacteriologist appointed, a visiting nurse and a force of sanitary inspectors placed at the health officers disposal.

At the request of State Health Commissioner Heg, Dr. L. L. Lumsden was detailed from the Public Health Service to investigate typhoid fever in the Yakima Valley and when he arrived on June 19, he found a reasonably efficient organization to assist in his work, a most interesting account of which is given in Public Health Bulletin No. 51.

A personal canvas was made and every person visited who had recently had typhoid fever, a clinical history obtained and filed at the health office.

In the city an extra force of scavengers was put to work and a general clean-up was ordered of back yards, vacant lots and alleys.

The health office was equipped with models of sanitary privies, manure boxes, garbage cans, and fly traps and these were exhibited and explained to the people who came to the office in an almost constant stream having been sent there by the sanitary inspectors, or coming in response to an invitation by mail or through the press. Lectures were given in the churches, schools, and other public places where these models were shown and their need explained to the people.

Sanitation was preached from every pulpit on a given Sunday and the Women's Clubs made it the subject of discussion at their meetings.

Commercial bodies were lectured on the profits accruing to a community in the saving of lives and the conservation of earning power which would result if typhoid fever, a preventable disease, were kept out of the community.

RESULTS.

Thus began a battle against filth and flies and for a better food and water supply that is still waging. Ordinances were passed:

(a) Fixing a bacteriological standard of purity for the municipal water supply.

(b) Fixing a standard of purity for milk and providing for the inspection of dairies.

(c) Regulating the sanitary conditions of all places where food products are stored, manufactured, served or offered for sale.

(d) Providing for meat inspection according to the standards of the Bureau of Animal Industry and prohibiting the sale of uninspected meats.

(e) Defining certain nuisances, prohibiting insanitary types of privies, making it compulsory to install tight garbage cans and fly tight manure boxes wherever needed.

With public sentiment in their favor these ordinances can be and are being generally enforced.

In the rural sections of a county which covers about 5,000 square miles such thoroughness is out of the question. But every case in the county suspected of being typhoid fever is visited by the health officer or a deputy, a complete case history taken, the sanitary conditions, food and water supply investigated and full directions given for bedside disinfection, screening the patient, protecting the food and water supply, disinfecting and disposing of excreta, sanitating privies, etc.

Blood is taken for making Widal tests or a culture in early cases, and a sample of water is brought in to be examined for colon bacillus.

All cases in the city or close in suburbs are visited at frequent intervals by a nurse in the Department's employ to insure the proper carrying out of the health officer's instructions.

Vaccination has not been generally employed but within the last few months the State Board of Health has begun the free distribution of vaccine and its use is now recommended as a prophylactic in persons of a family or household where a case has developed.

With the limited hospital facilities it has been impossible to hospitalize all cases, but an effort is made to have as many as possible taken to a hospital.

As previously stated there are no means of ascertaining the number of typhoid fever cases occurring in the city or county for any period prior to the May-June epidemic of 1911.

There were under treatment June 30, 1911 in North Yakima, 33 cases. One of these died July 2. During the following 12 months there were 53 cases. In 19 of these, including 6 distinct contact cases, the disease was probably contracted in the city.

Thirty-four were cases clearly originating in the rural districts. Only one of the 53 was a fatal case and that was a man who had been driven in from the country about 40 miles.

Cases were promptly reported by the attending physician in the rural districts and smaller towns with one exception. It might be noted in passing that the only exception, a town of about 2,500 population had three cases of typhoid fever which were not reported till after death.

Including these three cases there were reported 88 cases as under treatment in the county outside of North Yakima and originating in the year ending June 30, 1912. Of these 88 cases, six were fatal. There were then in the entire county with a population of 50,000 people, 141 cases of typhoid fever with 8 deaths, during the year.

Owing to the insufficient records it is impossible to establish any very intelligent comparisons.

This much we know, viz., that for the twelve months preceding there were 64 deaths from typhoid or approximately 128 per 100,000 of population, as against 8 deaths or 16 per 100,000 in the first year of active work covering the entire county.

For the City of North Yakima the results are also striking. In the year ending June 30, 1911 there were 31 deaths from typhoid fever and but 2 in the 12 months following or less than 11.8 typhoid deaths per 100,000 of population, while the Bureau of the Census Bulletin No. 109 gives us for 1910 a rate of 237.6 per 100,000.

That the saving of lives was not confined to typhoid alone is shown by the fact that the deaths from all causes in the county fell from 538 to 393. For the City of North Yakima alone the deaths from all causes were reduced from 247 to 192, or 75 less deaths during the year of active work. Bulletin No. 109 previously cited gives North Yakima a death rate from all cases for 1910 of 18. per 1,000 of population; during the year ending June 30, 1912, the rate was approximately 10.12.

The work has been arduous and somewhat expensive, but the results have been most gratifying and the end is not yet.

RURAL TYPHOID IN MANITOBA.

DR. R. M. SIMPSON,
Chairman of Board of Health, Winnipeg, Canada.

Read before the General Sessions, American Public Health Association, Washington, D. C., September, 1912.

In Manitoba, as in all rapidly developing prairie countries, typhoid fever is the most important disease that the rural health officer has to deal with, and indeed for this bad eminence there is no near rival.

It is especially with the local conditions which favor the prevalence of this disease and make its control difficult, and with the steps which, in the author's opinion should be taken to meet these conditions, that this paper proposes briefly to deal.

Of the farmers of our Province it may be said that they are an intelligent class of men, most of them of Anglo-Saxon descent and very much of the same type as those you meet in your own Western States, but it is to be remembered that in a new country where many are practically beginning life and yet not too well provided with worldly gear, people are apt to be careless about things that are better attended to in older communities. There is also among them the deeply engrained idea that water is the sole vehicle for the infection of typhoid, and this belief, while perhaps it has kept attention from more culpable channels, has at least this good feature about it that it has in the majority of cases led to the well being placed at a safe distance from any possible source of contamination.

In my opinion, although by no means to be disregarded, water plays altogether a subordinate role in rural typhoid and is by no means the important factor one must admit that it is in cities or towns.

The location of the chief source of offense on these prairie farms needs no great acumen or skill, for even a most cursory examination reveals as a rule a condition of affairs, the most favorable that could be conceived of for the transmission of an intestine borne disease.

One encounters everywhere a surprising lack of appreciation of the importance of safely disposing of all human waste, as if in the pure country atmosphere such procedure was quite superfluous. In fact in many of these farms where any convenience is provided at all, it is generally of the crudest and most undesirable character, a shallow earth pit or the ordinary box closet with a rough unventilated superstructure, erected as a rule in the vicinity of the stables. These places are nearly always poorly attended to, being rarely cleaned or disinfected, and in the summer months from the stench and swarms of flies are indescribably forbidding.

In consequence, as one might expect, the stables and outhouses are often used as privies and urinals, and to make matters worse the fly-haunted manure heap at the stable door, as being the driest place about the buildings is frequently also the favorite milking ground. Moreover it is only when the farm adjoins a lake or river that ice is procurable, and as screened milk houses are uncommon, this dangerous product receives no care or treatment that could abate one jot its power for evil. In such a state of affairs one has only to think of the possible advent of the Eberth bacillus, and he must have a poor imagination indeed who cannot conjure up the almost certain course of events.

There enters also here another factor that is not found in the East where mixed farming is the rule and where the population is comparatively stable. In these northern latitudes where the seasons are short, the staple product is generally wheat or other cereals, so that comparatively large tracts of land have to be cultivated. The sowing of the grain and its care during the summer is generally compassed by the farmer with the aid of the members of his own family, or at least with very little extra help; but in the autumn when the crop must be harvested and threshed in a few short weeks, much additional labor is required, and as a result during the latter part of August a vast army of harvesters, many thousands in number, is gathered from all parts of Canada and Northwestern states and scattered over the wheat belt. These men rarely work long at one place but are constantly moving about and later are gathered into threshing gangs that travel far and wide as their services are required.

Obviously a certain percentage of these men are bound to be convalescents from typhoid and some of them bacillus carriers, and you get to perfection the condition described by Hill as the "wandering infected intestine," and one with an unusually favorable path prepared for it.

When the disease is once established on one of these homesteads, the further spread is almost inevitable, as the rule is that the person who acts as nurse is perforce also the preparer of all the household food. Many cases arise in this way, for even where the physician takes the pains to detail the necessary precautions, on account of the poor facilities these can rarely be carried out effectively.

In considering these conditions which I have so succinctly outlined, it is evident that the first and most important thing is the proper disposal of all human excrementitious matter on these farms so that its transference by insect or other agencies is not possible. Nor can this matter be safely left to the individual, who rarely appreciates its importance and who is often difficult to convince, but should be the direct care of the municipal authorities. The health officer who now as a rule receives merely a retaining fee, with the understanding that his services are to be called for only in the case of epidemics, should be so renumerated that he may be expected to keep a supervision over the sanitary condition of his territory during the whole year. Under him should be a number of inspectors whose duty it should be to visit each of these farms at intervals, and where there has been neglect to correct it; any expense so incurred to be charged up against the property. As in most cases a water service with septic tanks and filler beds is out of the question, the best arrangement is the deep cement pit with a fly proof superstructure, and this to supersede all pits and box closets. Where the expenditure entails any hardship, these changes should be made by the municipality and easy terms arranged for repayment.

The great obstacle in the way of this work will be to get the municipal authorities to undertake it, as they are apt to look askance at any proposed expenditure not connected with the improvements of roads, culverts, etc.

In order to furnish an object lesson, I have had in my mind to recommend that the Central Board of Health shall take several of these municipalities and at the general public expense put them into such sanitary condition with proper medical supervision, confident that such a step, with its almost certain results, will have more educational value than any possible amount of literature or verbal admonishment.

In regard to the itinerant bacillus carrier of whom we have spoken, the case is more difficult, as there is nothing to herald his arrival and the task of running him to ground is often a hopeless undertaking. However, in this respect, the Federal Board of Health, which we hope soon to see established may do much good in pressing for a bacteriological examination of the urine and fæces of convalescent patients in all Canadian hospitals, their discharge to be dependent on such examination. If such a rule were established, we think it must of necessity soon extend to all cases in private practice.

Where cases do arise in one of these rural households, they should, if possible, be removed to hospitals, or where this cannot be done, the greatest pains should be taken to apprise the other members of the family of the dangers incurred and of the prophylactic measures to be taken, something concerning which the medical practitioner is too often remiss.

In Anti-typhoid vaccination we have a potent agency for good, but one, whose use for various reasons will be for a long time limited, and it is besides to be remembered that no dependence on it should in any degree abate our efforts to attain conditions such as were evidently intended by nature, when nothing that our bodies have discarded as effete or waste, or nothing which has been derived from such matters can ever again re-enter them with our food.

A PLEA FOR A MORE WIDESPREAD INTEREST IN THE INVESTIGATION AND CONTROL OF TYPHOID FEVER.*

PART I.

DR. WILLIAM C. HANSON,

Assistant to the Secretary, State Board of Health of Massachusetts, Boston, Mass.

PART II.

DR. LYMAN A. JONES,

State Inspector of Health, Berkshire Health District, North Adams, Mass.

Read before the General Sessions, American Public Health Association, Washington, D. C., September, 1912.

PART I.

In view of all the preventive work against typhoid fever in this country, it is somewhat disturbing to learn that, with certain exceptions, our typhoid fever mortality rates do not even approach the low rates attained in the leading cities of northern and western Europe. The question arises therefore, whether, as a nation, we have yet really grasped the situation.

The registration area of the United States, with a population exceeding 53,000,000, or 58.3 per cent. of the whole, had an average typhoid mortality rate of 29.5 for the years 1901 to 1909 inclusive, more than six times the 1910 rate for the European cities.

In 1910 the registration area of the United States included 21 states. Not one of these states had a rate as low as 10 per 100,000. The lowest rate, 10.7 occurred in New Hampshire; the next lowest in Massachusetts, 12.4. Seven states had a rate less than 20, ranging from 12.4 to 19.2 per 100,000, while in the remaining 13 states the typhoid mortality rate varied from 20.3 to 57.5 in one of the southern states where figures were limited to municipalities with a population of 1,000 or more.

If we attempt to make a comparison of the cities in this country the result is equally unfavorable.

Recognizing the presence of typhoid fever to an extent that should be regarded as a national disgrace, it may be well [in making a plea for a more widespread public interest in the investigation and control of the disease], to refer to some of the factors in the problem, some of the obstacles to be overcome in attaining the results desired. The greatest obstacle of all is the indifference of the people themselves to the presence of the disease. That typhoid fever should recur from year to year, especially during the late summer and early fall is accepted as a matter of fact. It is the result of the season; an easy way to avoid responsibility.

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*A preliminary report on this subject has been printed in the February, 1913, Bulletin of the State Board of Health of Massachusetts.

Local health authorities and especially physicians themselves have failed to realize their responsibility in the prevention of the spread of typhoid fever. Instead of being alert and on the watch for the disease and seeking for possible means of preventing its spread, too many local health officials are disinterested and are satisfied to wait until the matter is forced upon their attention by the presence of an unusual number of cases in the community. Even then their efforts are spasmodic, and owing to inexperience and lack of system, inadequate.

Too many physicians fail to have any sense of responsibility to the community when they are called to attend a suspicious case which later proves to be typhoid fever. No one is notified; no effort is made to trace a possible source of infection; other members of the household may not even be warned of impending danger; no steps are taken to protect the community until diagnosis is fully established. In the interval much valuable time is lost which should have been employed in attempting to locate and prevent the source of infection, and the patient has been permitted to infect others.

Another factor of importance is the lack of funds with which to conduct preventive health work. Generally speaking, individuals and communities are unwilling to spend money for things which they consider useless. Neither are they willing as a rule to make expenditures which do not afford some show in results. The Health Department is the only municipal department which has no material to show for its expenditures, which has nothing to balance the debit side of the treasurer's account save bills and salaries. The school department has its school houses and playgrounds to show for its expenditures; the police department has its station houses and uniformed officers; the fire department has engines and firemen; the water department has its reservoirs and rents. The health department practically has none of these things. The epidemic prevented does not appeal in like spectacular manner to the citizens nor does it appear anywhere as earnings, hence small appropriations, if any, are grudgingly given. Still another reason which contributes to this lack of funds for health work is that active work in this line often means inconvenience or discomfort to the individual concerned. In his annoyance, the individual often regards the Board's action as persecution. The result is opposition rather than assistance of the individual or community.

Other factors entering into the attainment of the control of typhoid fever are associated with the disease itself, with its manner of distribution.

They include spread of infection by pollution of public and other water supplies, by contamination of milk and other food supplies. Contact infection is probably of greater importance than has been hitherto recognized. This is especially the case since it is known that contact during the early stages of the disease, before diagnosis is established, will spread infection.

A campaign for the control of typhoid fever will involve effort in several directions. In general it will be necessary to show the people that typhoid fever is a preventable disease and to impress this fact upon them. It will be necessary to make plain the avenues through which the disease reaches them. It will be necessary to explain how the infection may be avoided. When the public has once grasped the real situation, there will come a demand that local health boards be active, and funds will be obtainable for carrying on the work.

But because the education of the public is apt to be a slow process, it is necessary to stimulate local health authorities to a greater interest and activity. The local board of health should be urged to study their records, to tabulate them in various ways in order to determine the danger points, to locate the sections of community where the disease predominates and to learn why it predominates in such places, whether it is because there is no public water supply or because there is no provision for the disposal of sewage, or whether contact infection is responsible, owing to insanitary housing conditions.

Concurrently the local Board of Health should be urged to look up every case of disease to obtain a detailed sanitary history of every patient and to investigate for suggestions as to a possible source of infection. They should be required to see that proper precautions are taken to protect the public.

It is necessary also to impress upon physicians the fact that their coöperation is not only desired, but required; that they shall report all cases and suspected cases of the disease and report them promptly, and that they assume a grave moral responsibility to the community if they fail to notify the authorities of all suspicious cases, since these cases are often the means of spreading the disease while the physician is waiting to establish a diagnosis.

It is necessary to impress upon all persons the fact that convalescents from typhoid fever should be kept under observation until they are no longer eliminating typhoid bacilli. Eventually it will be recognized that persons should not be employed in dairies or in handling food, or serve as cooks or waitresses, or be employed in similar occupations, until it is known that they are free from typhoid germs.

Such educational and practical work can best be begun and carried on by central health organizations such as Public Health Service, State Boards of

Health and Boards of Health in the larger municipalities where the work is already well organized and where trained workers and funds are available.

That these organizations may do the work successfully it is desirable that they shall have authority, in case it is not already theirs, to require local health boards to do the work satisfactorily or else to permit others to do it for them.

In the State of Massachusetts, there are twelve health districts, each of which is in charge of a physician who is known legally as State Inspector of Health. All of the State Inspectors of Health, however, are under the supervision of the State Board of Health. From time to time, it has been the custom of the State Board of Health to assign to one or more of the State Inspectors of Health a special subject for investigation and report. Recognizing the importance of a thorough study of the prevalence of typhoid fever in the state, with the object of further preventing its spread, a committee of four State Inspectors of Health was recently given this task to perform. The members of the committee were Harry Linenthal, M. D., Boston, Charles E. Simpson, M. D., Lowell, William W. Walcott, M. D., Natick, and Lyman A. Jones, M. D., North Adams, In the performance of their work, the members of the committee were allowed to disregard the health district lines and to be assisted through the office of the State Board of Health by the other State Inspectors of Health. Dr. Jones, who is present at the meeting, will tell the members of the American Public Health Association something as to the committee's plan of work.

PART II.

A campaign against typhoid fever will of necessity be developed along several lines, over a considerable period of time if results are to be obtained.

To secure knowledge as to the distribution of the disease, the morbidity and mortality rates in the various cities and towns of the Commonwealth will be studied through a term of years. The committee will arrange to receive reports of cases as they occur throughout the state daily, and an effort will be made to secure a detailed account of every case, reported or discovered, using for this purpose a particular form of blank for recording details.

From the tabulations and the detailed information above suggested it will be possible to discover in what places typhoid fever is usually prevalent. An opportunity will thus be given for special investigation in such places to determine why it is so, and to map out plans for diminishing the customary amount. In this connection the water and sewerage systems will be considered, the character of the milk supplies will be determined, and any other special factors will be sought out. Much of this information already exists, recorded in different places. An effort will be made to collate the same and to arrange it so that it will be readily accessible for study as to its bearing on this disease.

A study and record of the detailed information will also make possible the establishing of the relative importance of the different modes of infection, and growing out of such a study will arise suggestions as to the means of preventing infection, as to the management of carriers, etc.

Much of the work against typhoid will be educational. It will be necessary to convince the people, local boards of health and physicians even, that typhoid fever is a preventable disease; that to prevent it their active coöperation is needed; that suspicious cases should be reported early; and that the report of cases suspicious or irregular in type should not wait upon positive Widal tests, because this uncertain period, before a positive diagnosis is established, and when, as so generally occurs, no special precautions are observed, is practically the most dangerous of all from a preventive standpoint. These bases may afford the starting point of an outbreak, and one or two suspicious cases will often afford a clew as to the source of the infection.

The committee are of the opinion that the physician who does not report a case of continued fever as a probable typhoid, as soon as he had eliminated other common causes, assumes a moral responsibility to the community for any subsequent results in the community, if he has failed to take all the precautions which a qualified health officer would take when notified of the case.

The use of Widal tests and the bile cultures to determine the presence of bacilli in the blood, stools and urine, as an aid in making or confirming a diagnosis, should be encouraged.

It is the purpose of the committee to render available the information collected, by means of maps, card indices, etc.; to have frequent meetings to discuss and tabulate the information obtained; to inaugurate aggressive work in those places where typhoid fever has been prevalent, without waiting for the usual outbreak; and, in case there is any suggestion of an outbreak in a given locality, to have some one or more members of the committee visit that place at once to confer with the local authorities as to what measures may be taken to avert the threatened outbreak. Such work as has been suggested, persistently followed, cannot fail to produce favorable results.

SOME RELATIONS BETWEEN FILTERED WATER AND TYPHOID FEVER AS SHOWN IN THE TWO YEARS' SERVICE OF THE WILMINGTON FILTERS.

T. Chalkley Hatton.

Read before the Sanitary Engineering Section, American Public Health Association, Washington, D. C., September, 1912.

This brief description of the two years' work of the slow sand filters built at Wilmington, Deleware, is presented for two reasons. One is to show that the water delivered by a municipality to its consumers is not always responsible for typhoid fever, and the other is to present a graphical method of plotting the results of a filter, and their relation to typhoid fever, so that the unskilled citizen can interpret them.

The raw water for the City of Wilmington is taken from the Brandywine River, about two miles above its mouth. The population upon the Brandywine water shed consists of farmers only, with the exception of a few small villages of from 200 to 500 inhabitants, for about 30 miles above the intake for the water supply.

At this distance the Borough of Coatesville is built in a small valley crossing the Brandywine and draining into it. Coatesville has a population of about 11,000, is supplied with water for domestic purposes from a small creek running through the valley in which the borough is located, and discharges its sewage, without treatment, into the Brandywine River.

The water furnished to the City of Wilmington has been filtered through rapid filters for a number of years. During the early life of these rapid filters the effluent was good, and the city enjoyed a low typhoid fever rate. As the population increased, the capacity of the filters remained the same, thus the effluent diminished in purity until it was little better than the raw water.

During the last ten years of the life of these rapid filters the typhoid fever rate increased, and the water commissioners decided to build a new filter plant.

After very careful experiments were conducted by Dr. Albert Robin, covering a period of some two years, a scrubber was built. This is the first process through which the raw water goes, and consists of simply passing the water through beds of sea moss.

This intercepts the heavier solids in suspension and permits of a more rapid filtration through the filters.

After passing the scrubbers the water is pumped to an impounding reservoir large enough to hold from three to four days' supply. Here some precipitation is effected, and some biological purification occurs.

From the reservoir the water passes onto and through slow sand filters, of the downward type, at the rate of six million gallons per acre per day, thence to a clear water basin, holding about a day's supply, and from thence direct into the city's distribution mains.

In brief this is a very general description of the treatment given the consumers in the City of Wilmington from January 15, 1910, the date upon which the entire filter plant was put in operation, up to February 12, 1912.

Inasmuch as the filters were built for the purpose of eradicating typhoid fever, if possible, a very thorough plan was inaugurated of inspecting and reporting all typhoid fever cases, the City Board of Health coöperating with the officers of the Water Commissioners. It was hoped that the information thus gained, together with a daily bacteriological examination of the raw water and filtrate would establish the fact that the typhoid fever was largely dependent upon water borne organisms; that if these could be entirely eliminated typhoid would be practically obliterated.

During the first year of the complete operation of the filters; that is from July 1, 1910, to June 30, 1911, there was a typhoid fever epidemic beginning July 10, 1911, and continuing until September 25, 1911. During this period the filtrate was of excellent quality, containing an average bacterial content of 37 per c.c. and never exceeding 65 per c.c.

After November 1, and up to March 1, 1912, the quality of the filtrate was not nearly as good as it had been earlier in the season, and yet there appeared to be no typhoid fever cases except a few isolated ones, and the health of the community was unusually good, although the bacterial count in the filtrate reached as high as 3500 per c.c.

By a close study of the chart presented, it can, I think, be clearly seen that there is little or no relation between the water furnished and the typhoid fever occurring in Wilmington during the period from July 1, 1910, to July 1, 1911, and that we must look for other sources of infection, which was doubtless the house-fly.

The results of the operation of the filters for the year ending June 30, 1912, tells an entirely different story, as may clearly be seen by referring to the second chart here presented.

During January and February of 1912, considerable trouble was experienced with the proper operation of the filters through the formation of ice resulting in their becoming air bound. The bacterial count of the filtrate during this period averaging about 2500 per c.c., and running as high as 10,000 per c.c.

About the middle of January a virulent typhoid fever epidemic broke out in Coatesville resulting in nearly 260 cases. At this time the quality of the Wilmington effluent was unusually poor, and the Chief Engineer, Mr. John A. Kienle, had all the reservoirs immediately disinfected with hypo-chlorite of lime of sufficient quantity to give one part of available chlorine to one million parts of water. On February 13, the hypo was injected into the filters, and it will be seen by the chart that the bacterial count in the filtrate immediately dropped from 1,000 per c.c. to 8 per c.c. Introducing the hypo in the influent to the filters destroyed the schmutzdecks upon the beds and thus largely destroyed their biological action, the count rising from 8 per c.c. to 2,500 per c.c.

On February 26 apparatus had been completed to introduce the hypo into the clear water reservoir, after which the bacterial count dropped to an average of 55 per c.c., and remained fairly constant until April 10, when the hypo was discontinued.

This chart demonstrates three significant facts. One is that within three to four weeks after the typhoid fever appeared in Coatsville, 30 miles above Wilmington's water intake, the fever appeared at Wilmington to an alarming extent; that the introduction of hypo-chlorite of lime in the filtered water exterminated the typhoid germs in the raw water and broke the threatened epidemic, and that during the first part of the fiscal year, from July 23, to the middle of November, when the quality of the filtrate was unusually good, there was considerable typhoid fever in the city. This latter period, it should be remembered, covered the fly season in this climate.

One point which the speaker wishes to bring out, and which he thinks is strongly shown by these two charts, is that while it is here proven beyond any reasonable doubt, that the furnishing of pure water is necessary to exterminate typhoid fever, it is not, by any means, the only act necessary to be done, and that in all probability the common house-fly plays quite an important part in the spread of this dread disease.

In fact flies are doubtless the greatest source of infection through their comtact with milk, butter and other food stuff. The fact that the element of time is practically eliminated in the fly makes the source all the more probable.

The percentage of typhoid fever attributed to drinking water has doubtless been over estimated. Fly typhoid occurs during the late weeks of the summer, whereas water-borne typhoid appears during the winter.

There is, of course, a certain amount of typhoid fever present throughout the year which might be termed as residual or due to infection.

A brief description of the charts submitted may be of interest as the writer believes they graphically describe the workings of a filter better than any others which have come under his notice. They were designed and prepared by Mr. Edgar A. Hoopes, assistant chief engineer of the Wilmington Water Department, who is a technical man of unusual ability. The writer will describe them in Mr. Hoopes' own language.

"The values plotted are the 48 hour counts of the raw and filtered water on ordinary standard nutrient gelatine. The results obtained include both saprophytic and pathogenic organisms developing at 20° c. The count on gelatine rather than the count at a higher temperature on Bile Agar or Lactose Litmus Agar was selected for the reason that gelatine is almost universally employed as a laboratory standard. In sowing the raw water $\frac{1}{10}$ of 1 c.c. is transferred from the original sample by means of a sterilized pipette and $\frac{1}{2}$ and 1 c. c. of the filtered water are plated in a similar manner.

"It is obvious that a scale for plotting values of such a fluctuating nature must permit of an exceedingly wide range in a comparatively small area. The circle being the most economical geometrical figure was therefore adopted and the limits of range determined. It was found by inspection that the number of bacteria per c. c. in the raw water rarely exceeded 200,000 while in the filtered water the number was rarely less than 10 per c. c. Concentric circles were then drawn with radii whose lengths in inches were equal to the numbers representing the natural logarithms of 200,000 and 10 respectively. Intermediate values between these limits are obtained in the same way. The circumference of the circle representing the limiting value of the scale was divided into 365 parts representing days which was in turn collected into weeks and months. It was not deemed advisable to show each day by a full line owing to the great number required and the subsequent confusion of the scale. For this reason the days are indicated by short lines and the weeks or Sundays by the full lines running to the center.

"The number of bacteria per c. c. are plotted daily with the exception of certain Sundays on which no plates were made. The typhoid scale is derived by dividing the distance between the center of the scale and the circle representing 10 bacteria, into five equal parts—each part or circle being equivalent to two typhoid fever cases. This subdivision was necessitated by the fact that zero can not be represented on a natural logarithmic scale, its value being infinity. As there were periods when the city was free from typhoid it was necessary to have some method of representing zero and this value is attributed by the subdivision employed, to the center of the chart.

"The typhoid fever cases are plotted by weeks since the area available at the center of the circle is too small to permit of daily plottings. As a last remark the writer would explain that natural logarithms were selected instead of the Briggs or common logarithms for the reason that they permit of a more convenient sized scale by direct plotting."

MUNICIPAL CONTROL OF TYPHOID FEVER.

Charles R. Grandy, M. D., and C. J. Andrews, M. D.,
Norfolk, Va.

The State of Virginia has in the last few years been waging an apparently successful war against typhoid fever under the guidance of the State Health Department, whose educational efforts have been especially commendable. Some of our cities also have succeeded in reducing their typhoid mortality, till they compare favorably with other cities of the country. Thus there have been only twelve deaths from typhoid fever in Norfolk during the year ending September 30, 1912, or a rate of less than 15 per 100,000. Still I feel that our educational efforts with their accompanying promises, which are absolutely necessary to impress the public, are likely to be found a little too roseate, and that there will still be left a Residual Typhoid, just as it was found that, when, working on the old Water Borne Theory, the water supplies had been purified, there were still cases of typhoid, though not so many.

We feel that in the cities at least we have gotten nearly as good results as we are going to get from our present methods, for we have long been preaching that typhoid was a preventable disease and one that was "a disgrace to our civilization," and our health departments have been expending more time and energy on its prevention than on any other disease. But typhoid is still with us, though we have purified and protected our water supplies, then controlled our dairies, and finally tried to reduce the number of flies and thus prevent fly infection. All these measures have had their effect and have reduced the number of our typhoid cases. But the number still remains far too large. There must be some other source of infection. This source is usually attributed to contact either with active cases or with carriers, which not only spread the disease by direct contact, but are the sources of infection for the water, milk, food and flies, for we all must recognize that these are not the real sources of the typhoid bacilli, but merely the means of transmitting them from the infected to the well.

The urine and fæces of active cases are now pretty generally disinfected, though this disinfection is not always as efficient as it ought to be, but the typhoid bacilli persist in the urine and fæces of convalescents for variable periods. Thus it is said that about 10 per cent. of convalescents, when discharged from treatment, still have active bacilli in their discharges, though the specimens sent to the Norfolk Health Department Laboratory have not shown near such a large percentage.

Now the Report of the United States Public Health Service in 1908 on the Origin and Prevalence of Typhoid Fever in the District of Columbia concludes as follows: "The results of three years of study show that the disinfection of excreta of patients is frequently inefficient or neglected, and that there is need of legal control of typhoid fever patients and typhoid bacillus carriers. We are convinced that a vigorous campaign against typhoid fever as a CONTAGIOUS DISEASE and the adoption of measures, which would prevent the spread of the infection in milk, would eliminate the greater part of typhoid fever from the District of Columbia." The conditions here are much the same as in Washington. Our typhoid is as a rule a summer typhoid, there being months each year in the winter and spring when there are no cases reported. Again it is seldom that cases in Norfolk can be traced to the water supply. So we have to look for our source of infection to contact, food (usually milk) and flies, but back of all these is the typhoid bacillus carrier, either an active case, a convalescent, or one in which the bacilli persist for years.

While not arguing that we should decrease our efforts at destroying the means of transmitting the disease from the typhoid bacillus carriers to the well, our lack of success in the past has shown that we must "carry the war into Africa" and control the real sources of infection. To do this it will be necessary for our health department to treat typhoid fever as a *contagious disease*, as was suggested in the Public Health Report just quoted. Now there are two general methods of preventing contagious diseases; in one we confer an active immunity on the people and make the destruction of the morbid material secondary; in the other we put our reliance on keeping the people away from infection, or better still the infection away from the people. By using anti-typhoid vaccination the Army and Navy have gotten brilliant results, such results as were impossible with the ordinary preventive measures, and we have all undoubtedly wished that we might be able to get similar results in our cities, but we have been so far staggered by the apparently insuperable difficulty of giving three successive injections of vaccine to an unwilling body of citizens. It is difficult enough to vaccinate ignorant negroes against small-pox, and repeated outbreaks of this disease in our Southern cities show that our methods here are not thorough. One can well imagine how difficult it would be to give all of our negroes the necessary three anti-typhoid vaccinations, for, if one bad reaction were gotten, it would be next to impossible to catch the patient or his friends for a second injection. Still vaccination offers the best method of promptly checking a localized epidemic, as was shown by the way a small epidemic at the local Naval Training Station in the summer of 1911 was promptly stopped by vaccinating everyone in camp. But outside of the Services this can only be considered as an emergency method, or one which will be voluntarily used by a small, but increasing part of the population. There is still another objection to the use of anti-typhoid vaccination as a municipal measure, and that is that it, as now used, must be repeated every three years. The new method of Metchnikoff and Besredka, of using sensitized living bacteria, will probably extend the period of immunity as well as relieve the patient of febrile reaction and take only two injections. This improvement offers much for municipal hygiene, but it is still in the experimental stage, though it has been reported as successfully used on 750 people in England. Until we can get one vaccination which will protect for a number of years, we feel that the cities will have to rely on other means to eliminate their residual typhoid fever.

We have left the methods of isolation, generally used in controlling contagious disease. In this way we might handle typhoid in somewhat the same way we have been handling diphtheria. To be more explicit we would placard the room (not the house) in which there was a case of typhoid fever, and not allow the case to be discharged till permission was granted by the health department after an examination of the urine and fæces. If either of these showed the presence of typhoid bacilli, the patient might be kept in quarantine a week or so longer and a thorough course urotropine instituted. This would clear up a large number of cases, for it has proved efficient during convalescence, though not so in an old confirmed carrier. Cases still showing typhoid bacilli might be discharged with the warning, that their urine and fæces were still dangerous, that they must still disinfect them, that they must not carry on an occupation, which might infect the food supply of other people, and that at the end of a month they must again have their urine fæces examined by the health department. If they were still infected, an autogenous vaccine might be made and administered. These means would probably eliminate almost all the chronic carriers, and would keep those that were left under the supervision of the health authorities. Of course there might be some other chronic carriers, who either were never reported as having had typhoid fever, or who had the disease so mildly as to practically not produce symptoms. While such cases are beyond the control of the health authorities and cannot possibly be estimated, still their number should likewise be reduced by lessened sources of contact, which would result from the aforementioned plan.

Besides the protection furnished the community from carriers, this method would give the health authorities an efficient supervision of the ill cases and make the families disinfect the urine and fæces properly. We would also be able to see whether the patient were really getting proper care, and in case proper attention could not be given, the city should move the patient to a hospital and see that the community was protected from typhoid just as a city now sees that its citizens are protected from other contagious diseases.

The placard would also furnish a most efficient way to educate the Public, both as to how to care for typhoid and as to its dangers. Thus the placard on the door might read "This room is occupied by a case of Typhoid Fever. As the germs of the disease are found in the discharges of the patient, it is dangerous to use the same tableware and linen, unless thoroughly disinfected. It is also dangerous for a person, caring for a typhoid patient to prepare food for others, nor should they eat themselves without first carefully cleansing and disinfecting their hands. Patient is not to leave the room till permitted to do so by the Health Department after an examination of the urine and fæces." Printed directions should also be furnished, giving instructions as to how to care for the case and how to prevent the spread of the disease.

The most obvious objection to this plan would be that an ordinary city laboratory would not be able to make the necessary examinations. To answer this one of us, Doctor Andrews, has been making routine examinations of the stools of all convalescent typhoid cases before they were discharged from treatment. By using the method adopted by the United States Public Health Laboratory, as reported by Lumsden and Stimson, these examinations were found perfectly feasible without increasing the force ordinarily employed in the Norfolk Health Department Laboratory. Consequently we see no reason why any city should not adopt this plan of controlling typhoid fever, and feel further that it furnished the most hopeful way of dealing with a disease, which we all must recognize as far too prevalent throughout the United States.

INSTITUTIONAL VACCINATION AGAINST TYPHOID FEVER.

John N. Force, M. D.

Assistant Professor of Epidemiology, University of California.

Read by title before the General Sessions, American Public Health Association, Washington, D. C., September, 1912.

For the last seven years, the University of California has been conducting a system of illness insurance for its students. The benefits of this system are not paid in money, but consist in:

A. Preventive medical measures (compulsory).
  1. Medical entrance examination.
  2. Vaccination against smallpox.
  3. Lectures in hygiene.
B. Preventive medical measures (optional).
  1. Vaccination against typhoid fever.
  2. Isolation hospital for communicable diseases.
C. Curative medical measures (optional).
  1. Dispensary treatment.
  2. Hospital treatment.
  3. Lectures in First Aid (men).
  4. Lectures in Home Care of the Sick (women).

Medical entrance examinations and vaccination against small pox are compulsory measures intended to protect the student community against the importation of disease; dispensary treatment and the lectures are intended to protect the individual while in the community, and to increase his self-protective efficiency in after life. Protection of the individual who leaves the community is needed especially by that 20 per cent. of the student population of 3,750 who are enrolled in the engineering colleges. The engineering students spend their summers in camps, mines, irrigation projects or forests gaining the experience necessary for graduation. Under these conditions of service they are especially exposed to typhoid fever, and the opening of every college year brings a few of these summer campers to the infirmary to drag out the weary and expensive course of this disease.

At the opening of the last college year the Department of Hygiene considered the advisableness of offering the vaccination against typhoid fever to the student body, as a further means of self-protection for the individual, while absent from the community. A study of the reactions of enlisted men in the United States Army, following the administration of the army vaccine, showed that the standards used in classifying these reactions would be somewhat low if applied to college students, who resent bitterly anything which comes between them and the worship of that peculiar and exacting divinity known as "College Activities."

Any process which would keep the student "out of things" for twenty-four to forty-eight hours would be doomed to failure. However it was manifestly a departmental obligation to offer the privilege of vaccination against typhoid fever to the student body. The Department of Pathology

UNIVERSITY OF CALIFORNIA INFIRMARY.

RECORD OF ANTI-TYPHOID VACCINATION.

Name................................ *Sex*............ *Coll*........... *Class*.......

No. of Dose	I	II	III	No. of Dose	I	II	III
Date				*General reaction*			
Hour				Chill			
Size of dose				Fever			
Beginning of reaction				Pain			
Duration of reaction				Nausea			
Local reaction				*Remarks*			
Area of induration							
Area of redness							
Axillary adenitis							
Tenderness							
Ecchymosis							

Fig. 1 Form of individual record card.

UNIVERSITY OF CALIFORNIA INFIRMARY.

NOTICE TO PERSONS RECEIVING ANTI-TYPHOID VACCINATION.

In from three to five hours you will notice at the site of the inoculation, a small hard lump about the size and shape of half a walnut shell. This will be in the center of a somewhat larger area of redness. The red area may turn dark like a bruise. At the same time you may have a slight rise in temperature and perhaps some pain in the back and neck. You are requested to:

1. Measure and note the size of the hard lump............ cm. .... in.
2. Measure and note the size of the red area...................... cm. .... in.
3. Record your temperature every two hours for twelve hours following the inoculation.

If you are not familiar with the use of the clinical thermometer, do not shake it between observations, but note when the mercury reaches the highest point. This will be read when you return the thermometer. Always bring the thermometer with you.

Return on the two dates stamped on this card.

DATES OF INOCULATION.

Fig. 2 Card of directions with return dates.

was invited to coöperate by manufacturing the vaccine, and Dr. F. P. Gay, Professor of Pathology, suggested that the anticipated unpleasant reactions due to the vaccine when manufactured after the method of Wright, might be avoided if the vaccine were prepared according to the principles advocated by Besredka in 1902.

Accordingly the vaccine was prepared under the direction of Doctor Gay, by Dr. Edith Claypole to whom I am indebted for the following description:

> The "Army and Navy" strain, (long cultivated on laboratory media) of B. typhosus was used. A 24 hour bouillon culture was planted on ten large flat sided (Blake) bottles of agar, incubated at 37.5 degrees C. for 36 hours. The growth then washed off in sterile salt solution, 100 c. c. being the total volume. One c. c. of a strongly agglutinating serum (1—20,000) was added to this emulsion and it was allowed to stand one night in the ice box. Equal parts of absolute alcohol were then added to the suspension, the organisms quickly flocculated out completely and after centrifugalization in a high speed centrifuge, the supernatant fluid was poured off and the residue transferred to a sterile evaporating dish and dried in a partial vacuum over night. The residue was then scraped off carefully to avoid any contamination, put into a grinder and ground for one hour. This fine bacterial powder kept sterile can be used at any time, making up a suspension of $\frac{1}{16}$ mg. to 1 c. c. carbolated .85 per cent. salt solution.

Tests made on rabbits showed that the protective power of this sensitized vaccine was in no wise less than that of the ordinary unsensitized vaccine. Test vaccinations were made by Doctor Claypole of some ten or twelve persons connected with the Department of Pathology, and their reactions proving mild, the vaccine was turned over to the Department of Hygiene. Notices were at once posted to the effect that appointments might be made for vaccination against typhoid fever.

Though advertised only one month before the final examinations of the college year, the announcement brought 261 persons to take the first inoculation. Of these 246 finished the series of three doses. Each person at the time of the first inoculation was given a card of directions stamped with the dates for subsequent doses, and a clinical thermometer if familiar with its use. In this way temperature observations were secured from 161 persons. All observations were recorded on individual filing cards.

The technique of administering the vaccine consisted in painting a spot 1 cm. in diameter at the deltoid muscle insertion of the left arm and injecting 1 cc. of the suspension equivalent to 500 millions of bacteria. Two subsequent doses of the same amount were given at three day intervals using alternate arms. The syringe used had a clear glass barrel with a blue glass plunger. A sterile needle was used for each injection. After using, the needle was sterilized in oil which insured a longer life to it than was possible by boiling in water. The students made appointments in groups of twenty-five per hour which gave ample time for making the records. Six needles were employed which gave time for cooling.

Summary of Reactions after Administration of Sensitized Anti-Typhoid Vaccine.

Persons in series: Men—233; Women—28.

	1st inoculation.		2nd inoculation.		3rd inoculation.	
	Men.	Women.	Men.	Women.	Men.	Women.
Persons reporting	227	27	219	27	154	17
Beginning of reaction:						
1–2 hours	91	8	100	8	60	4
3–4 hours	89	9	92	7	57	5
5–6 hours	33	3	17	4	14	2
Duration of reaction:						
Under 12 hours	83	1	90	1	59	1
24 hours	85	4	77	10	48	3
36 hours	9	5	14	4	6	5
48 hours	32	10	28	6	16	9
Local Symptoms:						
1. Induration:						
Present	58	15	73	15	44	9
5 cm.	5	..	6	4	2	4
10 cm.	..	..	2	1	1	..
2. Redness:						
Present	86	14	96	13	62	9
5 cm.	35	4	33	5	13	3
10 cm.	4	..	6	1	1	..
15 cm.	..	..	1	..	..	..
3. Axillary Adenitis	18	3	37	3	16	..
4. Tenderness	219	21	212	22	147	13
5. Ecchymosis	16	4	15	8	10	6
General Symptoms:						
1. Chill	2	1	4	3	..	..
2. Temperature:						
Below 37° C.	41	4	44	4	34	3
37° C.	46	3	53	2	55	5
37° C. to 38° C.	54	11	50	8	26	3
over 38° C.	2	..	3	..	1	..
3. Fall in temperature during first 4 hours	63	3	41	1	19	1
4. Pain:						
Head	26	6	40	3	20	2
Arm	26	4	37	6	18	4
Shoulder	9	2	12	1	3	..
Neck	15	5	20	3	12	2
Back	7	2	12	4	8	1
5. Nausea	2	2	3	1	..	..
6. Faintness	3	..	1	..	..	..

The accompanying table summarizes the reactions of this student series. In almost every instance where the temperature is recorded as less than one degree elevation above normal, this rise amounted to barely one half of a degree centigrade. In general the reactions were more pronounced among the women. It will be noted that a number of persons showed a fall in temperature during the first four hours after inoculation. This usually was followed by a return to normal or over in the first twelve hours, but in some fifty cases the temperature had not returned to normal at the end of the twelve hours of observation.

In one instance a simple broncho-pneumonia developed 24 hours after the first inoculation in a patient with a history of arrested tuberculosis. The typhoid antigen probably had the effect of a tuberculin. One of the women complained of severe backache and three loose stools following the second inoculation. The second dose in general shows more marked symptoms than the others.

Two students reported faintness not amounting to actual unconsciousness, and one spent two days in the Infirmary with headache and nausea following three fainting attacks during the twelve hours following his first inoculation. This man, however, had no marked local symptoms or rise in temperature.

Besredka now advocates the use of living cultures, but as long as American statistics show satisfactory results with killed bacilli their use will no doubt be the most general in this country for some years to come. The sole objection to their use is found in the severity of the reactions produced by them, and if these reactions can be lessened without impairing the immunizing effect the vaccination against typhoid fever will become more popular.

This series of high-tension young adults was most potential for severe reactions, yet the results abundantly justify the use of the sensitized dead cultures, as a means of avoiding them.

THE SOLUBILITY OF WHITE LEAD IN HUMAN GASTRIC JUICE, AND ITS BEARING ON THE HYGIENE OF THE LEAD INDUSTRIES.

A. J. Carlson and A. Woelfel,

From the Hull Physiological Laboratory of the University of Chicago.

The following investigation was undertaken at the request of Dr. Alice Hamilton, Special Investigator of Lead Poisoning for the Federal Bureau of Labor, because of the availability in our laboratory of normal human gastric juice.

The relative importance of the skin, the lungs, and the digestive tract as avenues of the lead absorption in workers in the lead industries seem to be determined only to this extent that the skin is the least important. While lead may be absorbed through the intact skin under special conditions of prolonged application of lead compounds to the skin, it may be questioned whether under ordinary working conditions absorption through the skin contributes to industrial plumbism. There remain, then, to consider the lungs and the digestive tract. Meillère* seems to show that while poisoning may occur by absorption of lead from the lungs, this is not a channel of absorption of practical importance in the industries. Goadby,† on the other hand, concludes that absorption from the lungs is the prime factor in most forms of plumbism. Goadby subjected cats to breathing air charged with various kinds of lead dusts. Lead poisoning resulted in every case. The only precaution taken against lead dust reaching the stomach was brushing as much of the lead dust as possible from the animals' fur at the end of every inhalation period. It is therefore certain that some of the lead dust was swallowed with the saliva and the mucus from the respiratory passages. But Goadby's experiments seem to show that when the same lead dusts are given by mouth a much greater quantity is required than in the case of inhalation, the ratio estimated being 100 : 1. Thus, one cat (No. 12) was fed 0.8 gr. dry white lead a day for eighteen months without producing any other symptoms than some loss of weight. Other cats fed similar quantities of white lead daily developed symptoms only when alcohol was administered at the same time. This extraordinary tolerance of cats to dry white lead *per os* cannot be accepted as normal, in view of the results of our own feeding tests with white lead to dogs and cats. Legge & Goadby (*loc. cit.*) point

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*Meillère: *Le Saturnisme*, Paris, 1903.

†Goadby: *Jour. of Hygiene*, 1909, IX, p. 122; Goadby & Goodbody, *Lancet*, 1909, II, p. 988; Legge & Goadby, "Lead Poisoning and Lead Absorption," London, 1912.

out that on the whole, cases of lead poisoning are most frequent in the industries in which lead dusts are not adequately controlled. This is unquestionably true, but it does not follow that this lead dust enters the body mainly, or at all, by the lungs.

The lead dust, like any other dust, settles all over the person exposed to it. It permeates his clothes, and settles on the skin, the hair, in the mouth, and in the respiratory passages. In the mouth the dust acts as a stimulus to salivation, and in an animal like the cat, which does not expectorate, this increases the frequency of swallowing. Some men are in the habit of swallowing the mucus from the trachea—and even that from the nasal passages. It is, therefore, obvious that the chances for swallowing lead increases greatly with the presence of lead dust. At the same time some of the lead dust particles must reach the alveoli of the lungs, and may pass into the body without solution, like particles of carbon. But most of the lead dust that penetrates down to the bronchioles and alveoli must, unless dissolved, become entangled in the film of mucus and eventually passed out via the trachea. It is well known that after breathing coal dust or dense smoke for an hour a man may continue to discharge carbon-stained mucus from the trachea for more than twenty-four hours. It is obvious that only an insignificant fraction of the insoluble dust in the respired air is taken up by the alveolar cells, or by the leucocytes and retained by the lymph glands. The carbon particles in the lungs and lymph glands of an old coal miner or a stoker probably amounts to less than a gram, while the quantity of carbon passed in and out of the lungs via the trachea must have reached many kilos.

Lead poisoning occurs in industries where no lead dusts are produced. And since lead dusts in the respired air increases the changes of lead dust entering the stomach, it is clear that the digestive tract is in some cases the sole, and probably in all cases, the most important avenue of absorption of the lead in industrial lead poisoning.

There is no evidence that the lead salts are absorbed from the digestive tract or act locally on the mucosa, except when in solution. The strongest solvent in the digestive tract for the lead salts is the hydrochloric acid of the gastric juice, and of less importance the lactic acid, and other organic acids produced in the course of hydrolysis of proteins and of fats and of bacterial activity. In view of the humane and economic importance of lead poisoning in the industries, the literature on the action of the gastric juice on the different lead salts appears fragmentary. It was even assumed until recently that lead sulphate is practically insoluble in the stomach and intestines. This view led to the practice of giving sulphuric acid lemonade to lead workers as a prophylactic measure. Blum,* Goadby,†

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*Blum: *Wien. Med. Woch.*, 1904, LIV, p. 538; *Deut. Med. Woch.*, 1912, XXXVIII, p. 645.

†Goadby: *Jour. of Hygiene*, 1909, IX, p 122.

Shicksal* and Beck† have studied the solubility of various lead salts in dilute hydrochloric acid, in various artificial gastric digest mixtures, and in gastric juice. All agree that the lead sulphate is soluble in these media. One of Goadby's two experiments with human gastric juice (10 cc. gastric juice + 0.1 gr. of the lead salts, at 37° C. for one hour) appears to show that the lead sulphate is more soluble than is lead carbonate (white lead) or lead oxide (litharge). The second experiment showed practically the same solubility for the three salts. The work of Blum and Schicksal indicates that the presence of peptone in gastric digest mixtures increases slightly the solubility of the lead salts.

MATERIAL.

Samples of paint dust of "Basic Lead Carbonate" and "Basic Lead Sulphate" respectively, were sent us by Mr. A. M. Johnson, chief chemist of the Pullman Company. Mr. Johnson states that the samples submitted were typical of the paint dust produced in the Pullman shops by sand papering painted metal.‡ The dust samples contained per gram lead corresponding to the following quantities of lead sulphate:

$$\text{Basic lead carbonate paint dust} \left\{\begin{matrix}1.04\\1.04\\1.06\end{matrix}\right\} 1.05 \text{ gr.}$$

$$\text{Basic lead sulphate paint dust} \left\{\begin{matrix}0.86\\0.87\\0.82\end{matrix}\right\} 0.85 \text{ gr.}$$

Samples of sublimed white lead (basic lead sulphate) and of lead carbonate ("Old Dutch Process") were sent us by the Pilcher Lead Company, Joplin, Mo. These samples were not mixed with oil. On analysis they were found to yield per gram the following quantities of lead sulphate:

$$\text{Lead carbonate} \left\{\begin{matrix}1.12\\1.12\end{matrix}\right\} 1.12 \text{ gr.}$$

$$\text{Basic lead sulphate} \left\{\begin{matrix}0.98\\0.96\end{matrix}\right\} 0.97 \text{ gr.}$$

The Gastric Juice. Normal human gastric juice was obtained from a man twenty-seven years old, with complete constriction of the œsophagus and a gastric fistula of sixteen years' standing.§ The juice was secreted while the man was chewing palatable food when hungry. Hence it was normal "appetite" or "psychic" juice, not mixed with saliva. The total acidity varied from 0.40 per cent. to 0.52 per cent.

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*Schicksal: *Die Bekämpfung der Bleigefahr in der Industrie,* 1908.

†Beck: *Arb. a. d. Kais, Gesundheitsamt,* 1910, XXXIV, p. 446.

‡We are informed that the Pullman Company has recently discontinued the use of the Lead Carbonate paints in favor of the lead sulphate paints.

§Carlson: *Am. Jour. of Physiology,* 1912, XXXI, p. 151.

I. THE RELATIVE SOLUBILITY OF LEAD CARBONATE AND LEAD SULPHATE (PAINT DUSTS AND PURE SALTS) IN GASTRIC JUICE.

The results are given in Tables I–IV. The lead carbonate proved in every case to be much more soluble than the lead sulphate. The lead carbonate paint dust is nearly as soluble as the pure white lead, while the lead sulphate paint dust is less soluble than the pure basic lead sulphate. We are at a loss to account for Goadby's results showing greater solubility of the lead sulphate in gastric juice, except on faulty methods. A greater solubility of lead sulphate than of lead carbonate in gastric juice seems a chemical impossibility. We note that Goadby records only two tests and the lead was determined after *centrifuging the digestive mixture* instead of in a clear filtrate. It seems probable that varying quantities of the lead salts were present in suspension in addition to that in actual solution.

TABLE I.

RELATIVE SOLUBILITY OF BASIC LEAD SULPHATE AND BASIC LEAD CARBONATE PAINT DUST IN HUMAN GASTRIC JUICE.

25 cc. gastric juice+25 cc. water+0.5 gr. Basic Lead Sulphate paint dust, at 38° C. for 10 hours.		25 cc. gastric juice+25 cc. water+0.5 gr. Basic Lead Carbonate paint dust, at 38° C. for 10 hours.	
Exper. No.	Lead dissolved.	Exper. No.	Lead dissolved.
1	(1) 0.0396 gr. (2) 0.0276 gr.	1	(1) 0.1964 gr. (2) 0.2684 gr.
2	(1) 0.0582 gr. (2) 0.0680 gr.	2	(1) 0.2364 gr. (2) 0.2284 gr.
3	(1) 0.0436 gr. (2) 0.0400 gr.	3	(1) 0.2264 gr. (2) 0.2262 gr.
4	(1) 0.0420 gr. (2) 0.0594 gr.	4	....

Average—0.0485 gr.=5.7%. Average—0.2303 gr.=4.6%.

Peptone in concentrations of .1 per cent. and of 1 per cent. does not have a marked influence on the solubility of the lead salts, but the influence of peptone so far as it is in evidence is in the direction of increasing the quantity of lead dissolved. The formation of lead-peptone compounds might lead to the setting free of the chlorine ions in the lead chloride, and thus to the formation of more lead chloride from the carbonate and the sulphate. Our figures show that this is not an important factor in lead poisoning from the digestive tract.

The solubility of the lead salts in pure gastric juice is practically the same as that in similar quantities of .5 per cent. hydrochloric acid. It is therefore clear that the hydrochloric acid of the gastric juice is the all-important solvent. Pepsin, rennin, and other organic constituents may combine with the lead salts when in solution, but if this is the case, the reaction does not appreciably affect the quantity of lead salts held in solution.

TABLE II.

THE INFLUENCE OF PEPTONE ON THE SOLUBILITY OF THE BASIC LEAD SULPHATE AND THE BASIC LEAD CARBONATE PAINT DUST IN HUMAN GASTRIC JUICE.

25 cc. gastric juice+25 cc. water+0.1 gr. peptone+0.5 gr. Basic Lead Sulphate paint dust, at 38° C. for 10 hours.		25 cc. gastric juice+25 cc. water+0.1 gr. peptone+0.5 gr. Basic Lead Carbonate paint dust, at 38° C. for 10 hours.	
Exper. No.	Lead dissolved.	Exper. No.	Lead dissolved.
1	(1) 0.0802 gr. (2) 0.0784 gr.	1	(1) 0.2600 gr. (2) 0.2050 gr.
2	(1) 0.0484 gr. (2) 0.0660 gr.	2	(1) 0.2222 gr. (2) 0.2464 gr.
3	(1) 0.0422 gr. (2) 0.0636 gr.	3	....

Average—0.0628 gr. = 7.3%.   Average—0.2334 gr. = 46%.

We were especially interested in the action of milk on the solubility of the lead salts in human gastric juice and weak solutions of hydrochloric acid, in view of the fact that in some places lead workers are required to drink milk before starting work. And practical experience seems to show that milk or other food in the stomach minimizes the danger of lead poisoning from the digestive tract. When milk and gastric juice is mixed in the proportion of one to one, lead salts added, and the mixture incubated at body temperature for ten hours, not enough lead goes into solution to get a qualitative lead test. In two cases a positive qualitative test was obtained when the lead carbonate paint dust was used. The same results are obtained in mixtures of milk and 0.5 per cent. hydrochloric acid. But when the ratio of the gastric juice or hydrochloric acid to the milk is increased the lead salts are dissolved in proportion to the increase in the quantity of gastric juice or hydrochloric acid (Table IV).

The above action of milk is probably due to the fixation of the hydrochloric acid by the milk protein and the neutralization of the hydrochloric acid by the carbonate of the milk. Hence, when an excess of milk is added to the gastric juice there will be no hydrochloric acid to effect solution of the lead salts, while in the presence of an excess of gastric juice some free hydrochloric acid remains to act on the lead. We are inclined to the view that the formation of insoluble lead albuminates is a factor of minor importance in the above action of milk.

TABLE III.

THE RELATIVE SOLUBILITY OF LEAD CARBONATE ("OLD DUTCH PROCESS") AND BASIC LEAD SULPHATE ("SUBLIMED WHITE LEAD") IN HUMAN GASTRIC JUICE.

Lead Sulphate.			Lead Carbonate.		
Exper. No.	Digestive Mixture.	Lead dissolved.	Exper. No.	Digestive Mixture.	Lead dissolved.
1	25 cc. gastric juice 25 cc. water. 0.5 lead sulphate at 38° C. for 10 hrs....	(1) 0.1260 gr. (2) 0.1210 gr.	1	25 cc. gastric juice 25 cc. water. 0.5 gr. lead carbonate at 38° C. for 10 hours.	(1) 0.2940 gr. (2) 0.3044 gr.
2	25 cc. gastric juice. 25 cc. water. 0.5 gr. lead sulphate 0.1 peptone (1). 0.5 gr. peptone (2) at 38° C. for 10 hours.	(1) 0.1376 gr. (2) 0.1284 gr.	2	25 cc. gastric juice. 25 cc. water. 0 5 gr. lead carbonate. 0.1 gr. peptone (1). 0.5 gr. peptone (2) at 38° C. for 10 hours.	(1) 0.3302 gr. (2) 0.3100 gr.
3	50 cc. gastric juice. 0.5 gr. lead sulphate at 38° C. for 10 hrs.	(1) 0.1500 gr.	3	50 cc. gastric juice. 0.5 gr. lead carbonate at 38° C. for 10 hours.	0.3896 gr.

Average—(1) 0.1235 gr. = 25.0%.
(2) 0.1330 gr. = 27.0%.
(3) 0.1500 gr. = 30.0%.

Average—(1) 0.2990 gr. = 53.0%.
(2) 0.3201 gr. = 57.0%.
(3) 0.3896 gr. = 69.0%.

These experiments *in vitro* do not reproduce some of the conditions that obtain in normal gastric digestion. The fixation of the hydrochloric acid by the proteins takes place in the stomach as well as in the test tube

TABLE IV.

THE INFLUENCE OF MILK ON THE SOLUBILITY OF LEAD SALTS IN HUMAN GASTRIC JUICE AND IN 0.5% HYDROCHLORIC ACID.

Lead Sulphate.			Lead Carbonate.		
Exper. No.	Digestive Mixture.	Lead Dissolved.	Exper. No.	Digestive Mixture.	Lead Dissolved.
1	25 cc. gastric juice. 25 cc. milk; 0.5 B. L. Sulphate paint dust at 38° C. for 10 hrs.	(1) None. (2) None.	1	25 cc. gastric juice. 25 cc. milk; 0.5 gr. B. L. Carb. paint dust at 38° C. for 10 hrs.	(1) Trace. (2) Trace.
2	25 cc. gastric juice. 25 cc. milk; 0.5 gr. B. L. Sulphate paint dust at 38° C. for 10 hours.	(1) None. (2) None.	2	25 cc. gastric juice. 25 cc. milk; 0.5 gr. B. L. Carb. paint dust at 38° C. for 10 hrs.	(1) None. (2) None.
3	25 cc. gastric juice. 25 cc. milk; 0.5 gr. B. L. Sulphate paint dust at 38° C. for 10 hours.	(1) None. (2) None.	3	25 cc. gastric juice. 25 cc. milk; 0.5 gr. lead carbonate at 38° C. for 10 hours.	(1) Trace. (2) Trace.
4	25 cc. 0.5% HCl. 0.5 gr. B. L. Sulph. paint dust at 38° C. for 10 hours.	(1) 0.0578 gr. (2) 0.0562 gr.	4	25 cc. 0.5% HCl. 0.5 gr. B. L. Carb. paint dust at 38° C. for 10 hours.	(1) 0.3284 gr. (2) 0.3344 gr.
5	25 cc. 0.5 HCl. 25 cc. milk; 0.5 gr. B. L. Sulph. paint dust at 38° C. for 10 hours.	(1) None. (2) None.	5	25 cc. 0.5 HCl. 25 cc. milk; 0.5 gr. B. L. Carb. paint dust at 38° C. for 10 hours.	(1) None. (2) None.
6	50 cc. 0.5 HCl. 25 cc. milk; 0.5 gr. B. L. Sulph. paint dust at 38° C. for 10 hours.	(1) 0.0126 gr. (2) 0.0132 gr.	6	50 cc. 0.5 HCl. 25 cc. milk; 0.5 gr. B. L. Carb. paint dust at 38° C. for 10 hours.	(1) 0.1320 gr. (2) 0.1218 gr.
7	100 cc. 0.5 HCl. 25 cc. milk; 0.5 gr. B. L. Sulph. paint dust at 38° C. for 10 hours.	(1) 0.059 gr. (2) 0.0580 gr.	7	100 cc. 0.5 HCl. 25 cc. milk; 0.5 gr. B. L. Carb. paint dust at 38° C. for 10 hours.	(1) 0.4010 gr. (2) 0.4340 gr.
8	100 cc. gastric juice. 25 cc. milk; 0.5 gr. Basic Lead Sulphate at 38° C. for 10 hrs.	0.1740 gr.	8	100 cc. gastric juice. 25 cc. milk; 0.5 gr. Lead Carb. at 38°C. 10 for hours.	0.4500 gr.

so that the presence of proteins retards the appearance of free hydrochloric acid in the contents of the stomach. But the work of Cannon and others renders it highly probable that relaxation of the pyloric sphincter and entrance of the gastric content into the duodenum is ordinarily preceded by the development of some free hydrochloric acid in the pyloric portion of the stomach. This hydrochloric acid will, of course, tend to dissolve any lead salts in the chyme until it is neutralized in the duodenum. Albuminous food stuffs can, therefore, diminish the solution of lead salts in the stomach only to the extent that they fix the hydrochloric acid in the gastric juice.

The taking of milk is a more efficient prophylactic measure than the taking of an equal amount of other forms of proteins, because there is less appetite secretion of gastric juice with milk, and the fat in the milk depresses and retards the action of gastric secretagogues.

II. The Action of Bile on the Lead Salts.

The ferments of the pancreatic juice and the intestinal juice have, of course, no action on the lead salts, except indirectly in case of lead albuminates and similar combinations, formed in the stomach by lead salts already in solution. The solution of lead salts in the intestines must therefore depend on the weak organic acids produced in the hydrolysis of the foods, or bacterial action, and on the alkalinity of the digestive juices poured into the intestine.

Normal pancreatic juice was not available to us, but a number of tests were made of the possible solution of the lead sulphate and the lead carbonate paint dust in dog and ox bile. When mixed in the following proportion, 25 cc. bile + 25 cc. water + 0.5 gr. of the lead salt, with or without peptone, at 38° C. for ten hours, not enough of lead went into solution to give a qualitative test for lead. This applies to both the carbonate and the sulphate paint dusts. The presence of peptone had no effect.

III. The Relative Toxicity of Basic Lead Sulphate and Basic Lead Carbonate (Paint Dusts and Pure Salts) when Fed to Dogs and Cats.

Since it is not possible in experiments *in vitro*, even when normal gastric juice is available, to reproduce some of the essential conditions of gastric digestion, the final solution of the question of the relative toxicity of the different lead salts must be sought by feeding experiments. Goadby fed various lead salts to cats. Five cats received from 0.5 gr. to 0.8 gr. dry white lead (lead carbonate) per day for periods varying from one to eighteen months. According to Goadby this quantity of lead carbonate per day produced practically no symptoms unless alcohol was given at the same time. One must infer from Goadby's work that cats are unusually resistant to lead salts given by mouth. In an earlier work Leymann* showed, however, that even the slightly soluble lead sulphate produces toxic symptoms in eight or nine days when fed to cats in quantities of 0.2 gr. per day. Blum† concludes that the sulphate is less toxic than the other lead salts employed in the industries.

TABLE V.

Day.	Dog *A*, Weight 10 K.	Dog *B*, Weight 11 K.
1	2.0 gr. Basic Lead Sulphate paint dust in meat at 8 A. M. and 4 P. M.	2.0 gr. Basic Lead Carbonate paint dust in meat at 8 A. M. and 4 P. M.
2	Dog normal	Vomiting, great thirst, polyuria, depression, some tremors, no appetite.
3	Dog normal	Condition same as on 2d day.
4	Dog normal	Eats a little, drinks and vomits frequently.
5	Dog normal	Condition about same as on 4th day.
6	Dog normal	Considerably improved, eats, does not vomit, but seems depressed.
7	Dog normal	Dog seems fairly normal.
	Dog *C*, Weight 7 K.	Dog *D*, Weight 6.5 K.
	4.0 gr. Basic Lead Sulphate paint dust in meat at one feeding. Dog developed some constipation, but no other symptoms of lead poisoning.	4.0 gr. Basic Lead Carbonate paint dust in meat at one feeding. Dog ran practically the same course of acute lead poisoning as Dog *B*, with final complete recovery.

FEEDING EXPERIMENTS.—SERIES I.

Dogs of nearly the same size and age were selected, and 4.0 gr. of the lead sulphate and the lead carbonate paint dusts respectively were fed to the dogs in ground meat, either in one feeding or in two feedings, eight hours apart. The results are summarized in Table V.

The feces of dogs A and B (Table V) were collected for six days after giving the lead paint dust per mouth, and the quantity of lead determined, with the following result:

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*Leymann: *Arch. f. Hygiene*, 1892, XVI, p. 316.

†Blum: *Deut. Med. Woch.*, 1912, XXXVIII, p. 645.

Dog B, fed 4 gr. basic lead carbonate, containing 4.16 gr. lead determined as sulphate. Lead recovered in the feces 2.61 gr. or 62 per cent.

Dog A, fed 4 gr. basic lead sulphate, containing 3.28 gr. lead, determined as sulphate. Lead recovered in feces = 3.10 gr. or 94 per cent.

The lead in the feces of Dog C and D was not determined.

FEEDING EXPERIMENTS.—SERIES II.

Eight dogs were selected for this test, and grouped in pairs of approximately the same body weight. One of the dogs of each pair was fed the sulphate paint dust in meat, the other one given the carbonate paint dust in meat. The quantity of the lead paint dusts given each dog was fixed to equal 0.1 gr. lead sulphate per kilo body weight. The dogs fed the sulphate paint dust thus received a greater quantity of the dust, as this dust contained a lower percentage of lead than the carbonate paint dust.

The results are summarized in Table VI. The table shows that the dogs receiving the lead carbonate paint dust developed severe symptoms of acute lead poisoning within 24–48 hours after the first feeding, while the dogs fed the sulphate paint dust showed very mild symptoms of lead intoxication only after three or four feedings, that is, after 72–96 hours. Feeding experiments as tests of relative toxicity break down, of course, as soon as vomiting or lack of appetite appears, as one cannot control the quantity of lead salts eaten or retained. For that reason the experiment was discontinued as soon as there appeared symptoms of intoxication in the dogs receiving the least toxic lead salt, that is, the sulphate.

FEEDING EXPERIMENT.—SERIES III.

The results of the feeding tests with the sulphate and the carbonate of lead to dogs do not agree with those of Goadby on cats. It does not seem likely that cats have so much greater tolerance than dogs to lead salts *per os*. Legge and Goadby claim, indeed, that cats are especially susceptible to lead poisoning. Moreover, Leymann obtained symptoms in cats from feeding 0.2 gr. lead sulphate per day for eight to nine days. How are Leymann's results on cats and our results on dogs to be reconciled with Goadby failing to produce lead poisoning in cats on feeding the more toxic lead carbonate in daily doses up to 0.8 gr. for two to eighteen months? It is difficult to understand where any material source of error might be concealed in the relatively simple process of mixing lead salts with the food, and observing the animals.

Our own test series consisted of four healthy cats, which we may designate as A, B, C and D. The quantity of the lead salts mixed with the food each day was fixed to equal 0.1 gr. lead sulphate per kilo body weight of cat. The amount of ground meat, fish, or milk and bread with which the lead salts were mixed was less than each cat would ordinarily eat per day, so as to insure all of the lead salts reaching the stomach.

TABLE VI.

THE EFFECTS OF DAILY FEEDINGS OF LEAD SULPHATE AND LEAD CARBONATE PAINT DUSTS IN QUANTITIES OF 0.1 GR. PER KILO BODY WEIGHT.

Day.	Basic Lead Sulphate Paint Dust.				Basic Lead Carbonate Paint Dust.			
	Dog *A* 6.8 K.	Dog *C* 12.5 K.	Dog *E* 10.2 K.	Dog *G* 12.3 K.	Dog *B* 7.0 K.	Dog *D* 13.4 K.	Dog *F* 10.3 K.	Dog *H* 14.2 K.
1	Normal.	Normal.	Normal.	Normal.	Normal.	Normal.	Normal.	Normal.
2	Normal.	Normal.	Normal.	Normal.	Severe diarrhœa; vomiting; eats a little.	Diarrhœa; feces bloody; great thirst; vomits; eats a little.	Slight diarrhœa, otherwise normal; eats good.	Seems normal.
3	Normal.	Normal.	Seems normal, but does not eat as much as usual.	Normal.	Diarrhœa; depression; vomiting; eats a little.	Diarrhœa; vomiting; does not eat.	Diarrhœa; vomiting; eats a little.	Depression; some tremors; vomiting; eats a little.
4	Some depression; eats less than normally.	Normal.	Some depression; eats less than normally.	Had vomited during night; eats eagerly.	Diarrhœa; does not eat; great thirst.	Conditon fair; does not eat.	Diarrhœa; vomiting; eats a little.	Diarrhœa; vomiting; does not eat.
5	Refuses food; otherwise in good condition.	Slight depression. Vomiting.	Slight depression.	Slight depression; eats less than normally.	Condition fair; eats a little.	Condition fair; eats a little.	Diarrhœa, vomiting; does not eat.	Diarrhœa; depression; eats a little.
	Weight 6.9 K.	Weight 11.9 K.	Weight 9.8 K.	Weight 12.4 K.	Weight 6.6 K.	Weight 12.8 K.	Weight 9.9 K.	Weight 13.1 K.

Cat A.—Fed 0.3 gr. lead carbonate per day. The first three days the cat did not touch the food, although a new lot was prepared each morning.

On the fourth day the cat ate about four fifths of the food. No symptoms were observed, but the cat did not touch food for two days following. On the seventh to the eleventh day the cat ate about one fourth of the food each day. No obvious symptoms of lead poisoning.

Cat B.—Fed 0.37 gr. lead sulphate per day. Cat refused the food-lead mixture the first three days. The fourth day the cat ate all the food. On the sixth to the eighth day about one third of the food. On the ninth day all the food was consumed, but on the two following days less than half of it was taken. No lead intoxication in evidence.

Cat C.—Fed 0.31 basic lead carbonate paint dust per day. First day cat ate about three fourths of the food-lead mixture; second day cat ate about half of the mixture. On the morning of the third day the cat had vomited a considerable mass of partly digested meat. The cat seemed depressed during the third to the eighth days and refused all food. During the ninth to the eleventh days the cat ate about one fourth of the food each day. There were no further symptoms.

Cat D.—Fed 0.3 gr. basic lead sulphate paint dust per day. The cat did not touch the food-lead mixture during the first three days. On the remaining eight days of the feeding period the cat ate all the food on four days, and on the other days about one third of the food. No symptoms of lead poisoning appeared at any time.

This eleven day feeding period convinced us of one thing only, namely, that mixing the lead salts with the food is not a feasible method in the case of cats. Through taste or odor the addition of small quantities of lead salts to the ground meat, fish, or milk and bread renders the food mass so unpalatable that the cats will starve for days, rather than eat, and one cannot be certain of the cat eating even a small portion of the food on any day. In a test of the relative toxicity of the two salts it is, of course, essential that all of the salts given shall reach the stomach each day. The method of mixing the lead salts with the food was therefore abandoned. A second series of four cats were selected and 0.1 gr. of the lead salts per kilo body weight administered in gelatin capsules each morning before giving the customary food. The results are given in Table VII.

The cats varied in weight from 2.5 K. to 3.5 K. Hence 0.25 gr. constituted the smallest and 0.35 gr. the largest dose of lead salts given per day. Toxic symptoms were produced by all the salts, but the lead carbonate and the lead carbonate paint dust were distinctly more toxic than the basic lead sulphate and the lead sulphate paint dust. The toxic symptoms noted were vomiting, loss of appetite, constipation and depression. The feeding period was too short for the development of the chronic nervous symptoms.

It will thus be seen that cats and dogs show about the same susceptibility to lead intoxication *per os.* Lead carbonate and lead sulphate when given daily in quantities up to 0.1 gr. per kilo body weight produce toxic symptoms within two to eight days.

TABLE VII.

CATS FED 0.1 GR. OF THE RESPECTIVE LEAD SALTS PER KILO BODY WEIGHT EVERY MORNING BEFORE BEING GIVEN THEIR USUAL FOOD.

Feeding day.	Cat I. Fed Lead Carbonate.	Cat II. Fed Lead Sulphate.	Cat III. Fed Lead Carbonate Paint Dust.	Cat IV. Fed Lead Sulphate Paint Dust.
1	Normal.	Normal.	Normal.	Normal.
2	Vomited.	Normal.	Normal.	Normal.
3	Did not eat.	Normal.	Vomited.	Normal.
4	Did not eat.	Vomited.	Normal.	Normal.
5	Eats a little; depressed.	Seems normal.	Vomited.	Normal.
6	Eats a little; depressed.	Seems normal.	Did not eat.	Normal.
7	Vomited.	Seems normal.	Did not eat.	Normal.
8	Did not eat.	Seems normal.	Eats a little.	Eats a little.
9	Did not eat.	Vomited.	Eats a little.	Did not eat.
10	Did not eat; greatly depressed.	Eats a little; depressed.	Eats a little; depressed.	Eats a little.

IV. SUMMARY.

1. *Solubility of White Leads in Human Gastric Juice.*

a. White Lead Paint Dusts.

Solubility in pure gastric juice (25 cc. G. J. to 0.5 gr. lead).

Basic Lead Carbonate Paint Dust, 46 per cent.

Basic Lead Sulphate Paint Dust, 5.7 per cent.

Solubility in Gastric Juice + Peptone (25 cc. G. J., 0.1 gr. Peptone, 0.5 gr. Lead).

Basic Lead Carbonate Paint Dust, 46 per cent.

Basic Lead Sulphate Paint Dust, 7.3 per cent.

Solubility in Gastric Juice + Milk (G. J. 1—Milk 1).

Basic Lead Carbonate Paint Dust, none = 0 per cent.

Basic Lead Sulphate Paint Dust, none = 0 per cent.

Solubility in 0.5 per cent. HCl (25 cc. HCl to 0.5 gr. Lead).

Basic Lead Carbonate Paint Dust, 66 per cent.

Basic Lead Sulphate Paint Dust, 6.7 per cent.

Solubility in 0.5 per cent. HCl + Milk (HCl 1—Milk 1).

Basic Lead Carbonate Paint Dust, none = 0 per cent.

Basic Lead Sulphate Paint Dust, none + 0 per cent.

Solubility 0.5 HCl + Milk (HCl 2—Milk 1).

Basic Lead Carbonate Paint Dust, 25.4 per cent.

Basic Lead Sulphate Paint Dust, 1.5 per cent.

Solubility in 0.5 HCl + Milk (HCl 4—Milk 1).

Basic Lead Carbonate Paint Dust, 83.5 per cent.

Basic Lead Sulphate Paint Dust, 6.9 per cent.

b. White Leads.

Solubility in Pure Gastric Juice (25 cc. G. J. to 0.5 gr. Lead).

Lead Carbonate ("Old Dutch Process"), 53 per cent.

Basic Lead Sulphate, 25 per cent.

Solubility in Gastric Juice + Peptone (25 cc. G. J. to 0.5 gr. Lead).

Lead Carbonate ("Old Dutch Process"), 57 per cent.

Basic Lead Sulphate, 27 per cent.

Solubility in Pure Gastric Juice (50 cc. G. J. to 0.5 gr. Lead).

Lead Carbonate ("Old Dutch Process"), 69 per cent.

Basic Lead Sulphate, 30 per cent.

Solubility in Gastric Juice + Milk (G. J. 4—Milk 1).

Lead Carbonate ("Old Dutch Process"), 90 per cent.

Basic Lead Sulphate, 34.8 per cent.

2. *Toxicity of White Leads when Fed to Dogs and Cats.*

The lead carbonate is much more toxic than the lead sulphate. But both salts produce acute lead poisoning when given in quantities of 0.1 gr. per kilo body weight daily.

3. *The Influence of Milk.*

When milk and gastric juice is mixed in the proportion of 1–1, the hydrochloric acid of the gastric juice is so completely fixed by the milk proteins or neutralized by the carbonates in the milk that the mixture has virtually no solvent action on the lead salts, but when gastric juice is present in excess the lead salts go into solution in proportion to the excess of the gastric juice. When milk is taken into the stomach there occurs, of course, a similar fixation of the hydrochloric acid, and, in addition, the total quantity of gastric juice is diminished owing to the inhibitory action of the fats in the milk on the processes of secretion.

4. On the Basis of our Work we venture to offer these two Practical Suggestions:

(1) The lead carbonate is so much more toxic than the lead sulphate that lead workers as well as the state should aim at the elimination of the use of the carbonate in all industries where this is possible.

(2) In addition to taking other important prophylactic measures, the lead workers should drink a glass of milk between meals (say 10 A. M. and 4 P. M.) in order to diminish the chances for any swallowed lead to be dissolved by free hydrochloric acid of the gastric juice, as in some persons there is considerable secretion of gastric juice in the empty stomach.*

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*Hornborg: *Skand. Arch. f. Physiologie*, 1904, XV, p. 209; Carlson, *Am. Jour. of Physiology*, 1912, XXXI, p. 151.

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THE SCHOOL HYGIENE CONGRESS.

No community survey of school conditions has ever been made which has not brought out the need for better school sanitation and for better child hygiene. These surveys invariably find unsolved problems on the one hand and unapplied scientific knowledge on the other. The experts in school hygiene have yet much to learn while the schools of the land are on the average far behind in their application to their own affairs of the knowledge we already possess. Further scientific investigation and more practical scientific application is needed for the best solution of all of our problems, whether those problems be concerned with the heating of our school buildings, or with hook worms in our school children; with defective ventilation or defective vision; with architecture or adenoids; or with material equipment, muscular exercise, or the mentally exceptional child.

Thoughtful men and women are seriously concerned with this situation. This interest is becoming universal. The most impressive evidence to this effect may be found in the reports which come from the various committees that are concerned with the organization of the Fourth International Congress on School Hygiene.

Additional evidence of the seriousness with which our communities in general are looking upon the problems of school hygiene is shown in the report that comes from the Committee on the Program for this Congress. This Committee now reports over three hundred papers.

We predict that the large group of delegates and the comprehensive program of papers will have a powerful and stimulating effect upon the practice of school hygiene here and abroad. We believe that because of this Congress many communities will be led to make surveys of their school conditions and having found a need for improvement, will make that improvement. The delegates, the attending members, the committees, and the printed proceedings of this Congress will work in unison to spread its influence powerfully, and, we believe, effectively so that the net results of this international enterprise may in time be evaluated in terms of improved school sanitation, greater physiological efficiency of the school child, and a more intelligent, enterprising and effective future citizenship.

In this connection we would like to point out the fact that consciously or unconsciously the Buffalo Citizens' Committee which is supporting this enterprise financially is performing a unique and extraordinary service in the interest of every American city possessed of an immigrant population. Boston, New York, Philadelphia, Chicago, San Francisco, and all the rest of them are seriously concerned with certain types in their alien populations. The Buffalo Citizen's Committee may have had no such altruistic motive in mind, but its activities in connection with this International Congress on School Hygiene may easily be productive of better conditions in foreign schools and thus lead to an improvement in our future immigrants who are spending or will spend their school lives under the influence of these conditions.

There seems now to be no question as to the success of this Congress. We judge from the reports that have reached us that this question is now only one of degree. And it deserves success, not only because its various committees are working unselfishly in the interest of these high ideals, but also because our communities in general need the stimulation and the information which this organization will give. With the support present of organizing committees in all the states of this country and in practically all the more important states and nations of the world; with the support of the women's clubs, dental associations, medical societies, educational associations and sanitary, scientific, educational and social organizations and institutions; with an attractive exhibit and an impressive program; with over twelve hundred official delegates from communities, organizations and institutions in all parts of the world; with a growing membership of over twelve hundred—with all these forces now in active and effective operation, August 25–30, 1913, should mark a most important date in the history of school hygiene and the Buffalo Congress should become a powerful influence on the health of the human race.

TWO INVESTIGATIONS.

A recent report of investigations of the Dress and Waist Industry in New York City, made by the Joint Board of Sanitary Control, contains the following significant words, "It is with deep regret that we are compelled to make the statement that while sanitary conditions in the loft zone are excellent we are not certain that if a fire should break out today in one of the shops located in this zone there would not be great loss of life." About thirty per cent. of the shops have doors opening inward. Over fifty per cent. of the shops and about the same proportion of employees are located on or above the sixth floor.

The morning papers recently contained an announcement of another investigation. Referring to the recent fire of the Binghamton Clothing Company the usual comment is made that a "rigid investigation will be instituted by both city and state authorities."

Is this not a somewhat useless duplication of effort? We first proceed to make a careful diagnosis, then wait for the patient to die and then hold a post-mortem. We are doing either too much or too little. If it is only necessary to determine the cause of death, either the diagnosis or post-mortem is sufficient. The latter is undoubtedly more satisfactory because of its definiteness. But to prolong life we need the diagnosis followed up with suitable treatment.

In most cases we have laws and paid public officials; the power and means to deal with these sore spots in American industrial life. Too often the coroner's jury is called upon to fix the blame after the fact. None can avoid the conclusions that the real blame must be charged against our system of administrating the law by which paid public servants, sworn to uphold and enforce the law, fail so pitiably in their duties.

Not alone in cases of this kind but in all lines of public health endeavor we are confronted with the same situation. Our knowledge of combating diseases and protecting life is ten years ahead of our practice. Water purification is a well established science but a large percentage of our population is today drinking polluted water; methods for safeguarding the milk supply are known but epidemics of milk origin are reported with shameful frequency.

We need enlightened and fearless public officials who can and will enforce the laws and put into actual practice the knowledge which sanitarians and social workers have placed at their disposal.

THE RATS OF PROVIDENCE AND THEIR PARASITES.

GEORGE H. ROBINSON, A. M.

From the Providence Health Department and the Biological Laboratory of Brown University.

That rats are a factor in the spread of bubonic plague is an established fact. It has been confirmed beyond the shadow of a doubt, in India, in California, in England, and in other regions where plague is endemic. Rats dead of the disease have been found time after time in houses where outbreaks have occurred and immediate deratisation has effectively stopped further spread of the epidemic. These facts and a great amount of experimental work show that the rodent disease and that of human beings are identical.

Bubonic plague is originally a disease of rodents. Its home is thought to be the region of Thibet,[1] its natural host being the Tarbagan of that region. Other rodents are easily susceptible to the disease, as the hares of England, the ground squirrels of California, and the various species of the Muridæ found in all temperate and tropical regions of the globe. Owing to their universal distribution and great abundance the rats are to be considered as the greatest factor in the spread of bubonic plague.

When rats were first connected with the spread of the disease it was thought that they distributed the germs by contact with human food. The plague bacilli can be found in the mucous secretions, feces and urine[2] of infected rats and so there is some evidence in support of this theory. In 1898 Simond working in India demonstrated that plague could be transmitted through the bites of fleas. Later work by the Indian Plague Commission[3] and others has shown the rat flea to be the probable distributor of the disease.

To the cities along the Altantic coast of this country the spectre of plague is not very real but with the outbreak of the disease in the West Indies in 1912 it took on a more than ghostly substance to those conversant with the situation. American cities have an abundance of rats, the rats are presumably well supplied with fleas and it seemed only necessary for the introduction of the germs in order to bring about an epidemic. The Federal authorities required that all ships running between the infected region and American ports be fumigated and advised the municipal health officers to conduct an examination of rats.

In accordance with this recommendation an examination of the rats of Providence was undertaken under the direction of Dr. Charles V. Chapin, Superintendent of Health. The object of the work was to determine if possible the presence of any epizoötic among rats, the kinds of rats and the number and kinds of fleas on the rats. At first the work was confined to the water front, but later its scope was extended to the entire city.

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[1] Preble, Paul, The Tarbagan (Arctomys bobac) and Plague, Public Health Reports XXVII, 1912, 31.

[2] Baxter-Tyrie, C. C., Plague in Queensland, Journal of Hygiene, V, 1905, 315.

[3] Report of Plague Investigations in India, Journal of Hygiene, VII, 1907, 395.

The work began on July 18, 1912, and continued with several short intervals, up to the last of December. From the beginning of the examination until the first of September the rats were taken in traps along the water front. A daily patrol of the shore was also made in order to pick up any which might have died. Only three were found dead. About the first of November a bounty of five cents was offered for every live rat brought to the laboratory and 142 were purchased.

The technic of the examination was as follows: the rats were caught alive in the French wire traps and carried to the laboratory; there they were placed in a reservoir of illuminating gas for several minutes killing the rats and stupefying the fleas; the rats were then immersed in a weak solution of corrosive sublimate or formalin and left over night; during this time the putrefactive bacteria entered the circulation but a shorter exposure to the fluid was not sufficient to penetrate the thick fur and kill the parasites; the wet fur was then turned aside with forceps, the parasites were removed and their position on the body was recorded; the lymph glands were then exposed, the abdomen was opened and the appearance of the organs especially the liver was noted.

During the months July, August and September, 118 rats, and from October to January, 223 were examined, making a total of 341. These were evenly divided as to sex: 333 were the brown rat (Mus norvegicus), 2 were the roof rat (Mus alexandrinus), 1 was the black rat (Mus rattus), 4 were apparently crosses between the brown and roof rats, and 1 appeared to be a cross between the black and brown rats. The two specimens of the roof rat were taken from the New York-Providence boat and so were doubtless New York rats.

The size ranged from 18 to 46 c. m. (7 to 18 inches). Studying the brown rats by the biometric method we find them grouped about two distinct modes, those of 24 and 36 c. m. in length. Thus we have a clear differentiation into the adults and those which are still immature. Of these 59 per cent. were adults and 41 per cent. were young.

The results of the examination for fleas were as follows:

Total number of rats examined	341
Total number of rats infected with fleas	195
Total number of fleas	2053
Average fleas per rat	6
Average fleas per flea-infected rat	11
Largest number of fleas from one rat	300

Per cent. of fleas:[1]

Xenopsylla cheopis Rothschild	75
Ceratophyllus fasciatus Bosc	22
Ctenopsyllus musculi Duges	2.5
Ctenocephalus canis Curtis	0.5

By way of comparison it is interesting to note that in California the average fleas per flea-infected rat was 3.5,[2] and a yearly average of 2.7 was found. In India the average fleas per rat was 4.0.[3] All who have experimented are agreed that the two most numerous species which we found, Xenopsylla cheopis and Ceratophyllus fasciatus, will bite man. Concerning the others there is some dispute but since they comprise only 3 per cent. of all they are of little consequence.

During the plague epidemics in India and California much importance was made of the location of the primary buboes on the rats as indicating the point of inoculation or the flea bite. In India[4] 74.3 per cent. of the buboes were located in the cervical region. No data on the regional distribution of fleas on rats in India is available but on guinea pigs artificially infected by the Commission, 88.9 per cent. of the fleas were found on the head and neck. Pound[5] in Australia reports fleas as most commonly occuring on the head and neck of rats. In San Francisco[6] 72.4 per cent. of the buboes were found in the groin and none in the cervical region while 73 per cent. of the fleas on the rats were found on the hind quarters.

With these results in view the location of the fleas on the Providence rats was noted and the following results obtained; 16 per cent. on the head and neck, 16 per cent. on the fore legs and shoulders, 41 per cent. on the body, and 27 per cent. on the hind legs and pelvic region. These results hardly coincide with those found in other places. If we compare the relative areas of the different regions we find that they stand in about the same ratio as the percentages of fleas found on them. So it seems quite just to believe that the fleas are distributed with comparative uniformity over the body of the rat. However, with the oncome of cold weather there was noticed a slight change in position from the exposed portions of the body to the more thickly furred pectoral and pelvic regions. The exact figures were as follows:

	July-September	October-December
Head and neck	15 per cent.	16 per cent.
Front legs and shoulders	15 per cent.	16 per cent.
Body	46 per cent.	37 per cent.
Hind legs and hips	24 per cent.	31 per cent.

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[1] Acknowledgment is made of the assistance of Mr. Nathan Banks of the Bureau of Entomology in confirming the identification of the fleas.

[2] McCoy and Mitzmain, The Regional Distribution of Fleas on Rodents, Parasitology, II, 1909, 301.

[3] Seventh Report of Plague Investigations in India, Journal of Hygiene Plague Supplement, January, 1913, 217.

[4] Report of the Indian Plague Commission, Jour. of Hygiene, VII, 1907, 386.

[5] Pound, Report of Plague in Queensland, 1900–1907, 143.

[6] McCoy, G. W. A Report on Laboratory Work in Relation to the Examination of Rats for Plague at San Francisco, Cal. Public Health Reports, XXIII, 1908, 1051.

The average fleas per rat for the months July to September was 10.2 and that for October to December was 3.7, showing a marked reduction during the colder months.

Twenty-one per cent. of all the rats were found to be infected with mites and they became more numerous with the onset of cold weather. Lælaps echidninus Berlese was the species found. In one case, at the Providence Coal Co. stable, a specimen of Myonyssus decumani, Tiraboschi, said to occur on Mus decumanus in Italy, was found. It is interesting to note that a short while previous to the capture of its host an Italian barkentine had docked near that point. The common rat louse Polyplax spinulosus Burmeister was found on 24 per cent. of the specimens. On 12 per cent. were found open sores.

No numerical study of the occurrence of internal parasites was made except in cases where the liver was affected. This condition was found in 7 per cent. of the rats and was due to the encysted form of the cat tapeworm Tænia crassicollis and to the ova of some unknown parasite found also by McCoy[1] in California. One noticeable and possibly significant fact is that from two meat markets from which were obtained 15 and 22 rats, respectively, both these parasites were present in the liver in 25 per cent. of each lot. A bladder worm was present in all of six cases which were examined.

The question as to whether there is a relation between the filthiness of the home of the rat and the number of fleas is of interest. The dirty rats of the stables and docks might be expected to bear more fleas than would the cleaner rats of other localities. It was found in these investigations, however, that the average fleas per rat from the stables, and docks was especially low, in but few cases exceeding one flea. On the other hand the averages from the cleaner places were generally higher. The average from a restaurant from which 40 rats were taken was 36 fleas. That from a creamery was 22, from a dwelling house 10, from another 8, from a drygoods store 10, from a bar room 1, from two markets 1 each. The reason for this is doubtless that the fleas breed in the nests of the rats[2] and are only on the bodies of the rats to feed. So a damp, cold location of the nests would strongly inhibit the breeding of the fleas.

The conclusions from our study of the rat situation in Providence are that rats are present in large numbers and cannot be exterminated until the city is rebuilt with ratproof construction; these rodents are supplied with as many fleas as are those in plague infected regions; opportunity for the fleas to bite human beings is always present as the rats are for the most part closely associated with man. It would seem, therefore, that only the germs of plague are lacking to complete the mechanism of an epidemic in Providence.

[1] McCoy, G. W. Pathological Conditions found in Rats, Public Health Reports, XXIII, 1908, 1365.

[2] Reports on Plague Investigation in India, Journal of Hygiene, VIII, 1908, 241.

PUBLICITY IN PUBLIC HEALTH WORK.

WOODS HUTCHINSON, M.D.
New York.

Read before the Municipal Health Officers' Section American Public Health Association, Washington D. C., September, 1912.

I think it is one of the most significant signs of the progress of the times that the question of publicity by doctors is allowed to be discussed in an assembly largely composed of doctors. The doctor of twenty-five years ago was the most private person imaginable. He was scarcely allowed to speak in public at all for fear he might give away trade secrets. Publicity is, in my judgment, one of the principal things in connection with health work. I think most of us have rather undergone a change of attitude, in that regard, toward the community and toward our work for the community. I think our old feeling used to be that what we longed for was a good strong law and plenty of legal backing and then to be able to put right through what was good for the people, whether they liked it or not, as is done with such admirable results in Germany. But I think if real results are counted, these should be measured by getting people to live and act in a sanitary manner of their own accord. We speak of the backward condition of public health matters in America. I believe that we are laying here the foundations for a broader, better and more intelligent form of sanitary life and work by the community than in any other country of the civilized world at present.

The next question is, how and where are we to get this publicity? Through the organs already established for that purpose, the newspapers. I ask the question, how are we to get publicity? It would be more correct to ask, how are we to avoid it? The people are eager for it; they are anxious to get information bearing on health and the protection of themselves and their families and children from disease. I think, whatever our political views may be—whether Democrats, Republicans or Progressives—we cannot but be struck with the immense significance of the fact that one of the presidential candidates, whom all who know him, whether they agree with him or not, consider one of the keenest and shrewdest politicians and best judges of public sentiment we have ever had, has chosen to make his campaign largely on a platform of public health improvements and social betterment. It is a tribute to the American physician such as has never been paid before. Health has become a popular issue and is becoming more popular and more constantly in demand by the people all the time, and all we have to do is to fall in with these requirements and get rid of the idea that it is not becoming in us to speak of the secrets of our profession and to publicly discuss science for fear we shall be misunderstood by the public.

How shall we get our message to the people on those subjects? First of all, it must be made in a manner to be clearly understood by the people and we need not hesitate to use the utmost frankness. We shall always have to face the risk of a certain amount of misunderstanding.

We should, of course, be cautious in the use of difficult and unusual terms, but, apart from that, I believe we can trust the intelligence of the American people to almost any extent. I believe it is not by any means necessary for us to assume that we must tell them only what is absolutely true and fixed and certain beyond possibility of doubt. Let them know the new things; let us take them into our confidence and show them what is happening. Don't pretend to know it all, but show them how things are growing and developing and tell them frankly that this is the best we know in the present state of our knowledge and as soon as we know any better, we will tell them, and I believe they will return our confidence and form their own judgments and act upon the things we put before them in a much more intelligent and reasonable way than we might be inclined to think.

The other attitude we ought to assume in dealing with the public on health matters is an attitude of becoming modesty; not to give it as something which has been revealed to us as coming down from Sinai, but to remember the exceeding recentness of much of our scientific knowledge. There was an ancient tradition of mystery in medical matters and there was a good deal of sound judgment in that veil of mystery up to twenty-five or thirty years ago, because we didn't have so very much to tell that would have stood the light of publicity.

I have sometimes thought that we fail to recognize to what a high degree the errors and illusions and obstacles, which we are fighting in the public mind, are the things that our ancestors in the medical profession of two hundred years ago taught the people. We must remember that we have only come into the heritage of our knowledge quite recently. Kipling has put it neatly in his poem "Our Fathers of Old"

"Excellent herbs had our fathers of old,
Excellent herbs to ease their pain;
Poppy and monks-hood and marigold,
Eyebright, orris and elecampane,
Anything green that grew out of the mold,
Was an excellent herb to our fathers of old."

Then he praises their courage and devotion, but winds up:

"Wonderful little when all is said,
Wonderful little our fathers knew,
Half their remedies cured you dead,
Most of their teaching was quite untrue,
Look at the stars when a patient is ill,

Dirt has nothing to do with disease,
Bleed and blister as much as you will,
Blister and bleed him as much as you please,
Whence enormous and manifold
Errors were made by our fathers of old."

We should remember that we have that sort of tradition behind us, and not expect people to take us all at once at our own valuation as full-fledged angels who are merely on earth to make life happier. Another thing I think we can depend upon and that is an appeal to the desire for well doing and for kindliness in the mass of the community. We often, I think, are inclined to lose patience with the ignorance of the masses of the community, and with the selfishness and greed of the more successful classes, but a great deal of both is due solely to ignorance. They hardly realize what they are doing when they are grinding down the working sixty per cent. of the community with low wages and bad sanitary surroundings and long hours and overwork. We must be patient with them and appeal to them, and I believe the more we have to do with the masses of men and the nearer we come to them, the more we shall come to believe in the kindness of men, in the goodness of women and in their readiness to respond to anything which makes for the health and happiness of their children. I sometimes used to think, when I was a public health officer, that if I could only have the feeling that the community, or even a part of it, felt that by our existence and activity, his little one could sleep in greater safety, it would be one of the greatest possible triumphs and most satisfactory sense of having done something really worth while. I cannot conceive of any man in any profession, of any type of worker, where this sense is surer than in the public health officer, who has tried to do his duty and to help his time and improve the surroundings for little children. Who is more certain when he comes to that Last Judgment, the verdict of history, to hear from the Spirit of the Nation, "Inasmuch as ye have done it unto the least of these, my little ones, ye have done it unto Me."

BACTERIOLOGICAL INVESTIGATION OF AN OUTBREAK OF SEPTIC SORE THROAT IN BALTIMORE—ABSTRACT.

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Baltimore, Md.

(From the Bacteriological Laboratory of the State and City Boards of Health, Baltimore, Md.)

Read before the General Sessions, American Public Health Association, Washington, D. C., September, 1912.

In the latter part of February and in March of the present year it became evident that there was a marked outbreak in Baltimore of an unusual type of throat infection associated with or followed by one or more of the following conditions: cervical adenitis, septicæmia, peritonitis and erysipelas. The situation became so striking that it led to a meeting of certain physicians who, in their practice, were seeing numerous cases of the so-called "septic sore throat." At this conference it was learned that a very large proportion of the cases was occurring on the route of a particular dairy (Dairy No. 1), owned and operated by one of the most intelligent and enterprising men in the business.

Directly sequent to this the health department made a bacteriological investigation of this milk supply and an examination of the herds of those shippers whose milk fell under suspicion. The inquiry made by the department into the possible relation of the milk from Dairy No. 1 to this epidemic is, therefore, divisible into a laboratory and a field investigation.

The laboratory study of the epidemic is separable into that of the pasteurized product, that of the raw milk, and that of cultures from the throats of the employees of the dairy and from cases of the disease.

Examination of Pasteurized Milk from Dairy No. 1.

For some years prior to the time of the occurrence of this inordinate number of cases of septic sore throat among the patrons of Dairy No. 1 the proprietor had been pasteurizing all his milk at a temperature of 158° to 165° F. for two and a half to five minutes. However, just before the outbreak reached its climax, but nevertheless after it was well started, pasteurization was temporarily interrupted by repairs being made to the apparatus. The operation of the plant was stopped on January 29, but the exact date when pasteurization was begun can not be determined; however, it was not later than the 5th of February. During this time raw milk was supplied to the clientele, as this was thought a safe procedure owing to the intensely cold weather. In justice to the owner of the dairy it should be stated that as soon as his attention was called to the undue incidence of the disease on his customers he not only consulted a well-known sanitarian, but also accepted his recommendations, including the installation of a plant for the pasteurization of milk at 145° F. for thirty minutes. The new pasteurizer was placed in operation in the 19th of March.

Milk was collected at this plant before the new holding device was installed and centrifugalized in quantities of fifty cubic centimeters for thirty minutes. From the sediment cultures were made on the surface of agar plates. Colonies fished from these were studied on various culture media, and the organisms isolated corresponded in all respects to the Diplococcus pneumoniæ. When inoculated subcutaneously into white mice they produced a fatal septicæmia, the diplococcus being recovered from the liver, spleen and heart blood.

We also subcutaneously inoculated white mice with the sediment from this milk. These animals, however, did not die.

RAW MILK COLLECTED AT THE RAILROAD STATIONS.

The department started to examine the milk shipped to Dairy No. 1 on March 20, the samples being collected at the local depots. The two hundred and fourteen milks brought to the laboratory were examined by the Slack method for pus and streptococci. Owing to the fact that each specimen represented the mixed milk of several cows, any sample showing ten pus cells or more per field was regarded as suspicious. As a result of this twenty-three were subjected to further investigations.

The sediments from these milks after centrifugalization were suspended in normal salt solution and half of each was injected into a mouse. Fourteen of these animals died and Gram-positive, lancet-shaped diplococci with capsules were found in smears from the liver, spleen and heart blood.

From each of these dead animals plate cultures were made from the various organs, and in six instances we isolated microörganisms corresponding morphologically and culturally to the pneumococcus. From one of the autopsies we also obtained the Streptococcus pyogenes.

From the same animal we recovered a Gram-positive coccus occurring in pairs or in chains of from ten to twenty organisms surrounded by a distinct halo or capsule; the chains were formed of paired cocci, and there was either no constriction in the capsule or but a very slight one between these intracapsular groups. This organism produced cloudiness in broth, acidulated and coagulated milk, did not liquefy gelatine, failed to produce any change in inulin serum-water, and rendered Libman's dextrose-serum-agar very cloudy. On blood-agar the microörganism grew as moist colonies with a tendency to spread, and produced a zone of hemolysis. There was acid production in dextrose-, lactose-, saccharose-, and maltose-bouillon, but none in inulin, raffinose, or mannite. Later this streptococcus fermented raffinose-broth. It, therefore, closely resembles, morphologically and culturally, the descriptions of the Streptococcus epidemicus. Subcutaneous inoculation into a white mouse resulted in death within twenty-four hours. The post-mortem discovered marked purulent peritonitis, and the streptococcus was isolated from the peritoneal fluid and from various organs.

MILK COLLECTED AT DAIRY FARMS.

As soon as the milk of any shipper was found suspicious as a result of the pus and streptococcus count, inspectors were sent to the dairy farm and samples of milk separately collected from each cow. These specimens were subjected to the same examinations as have been previously described. As a result of this we found six milks showing pus cells in excess of twenty-five to the field. In one case the count was approximately one hundred, and the cells occurred in large masses obscuring the field. This latter milk was from a cow on the dairy farm of the shipper from whose product the organism resembling the Streptococcus epidemicus had been recovered.

Although animal inoculations were made from the sediments of these various suspicious samples we failed to isolate any organism other than the pneumococcus. This was obtained from five of the fifteen mice injected with these different sediments. From the milk showing the above mentioned high pus count, we failed to isolate any streptococcus- or pneumococcus-like organism at autopsy owing to the fact that the cultures were overgrown by colon bacilli.

CULTURES FROM THE THROATS OF EMPLOYEES OF DAIRY NO. 1.

Forty-six cultures were made at the pasteurizing plant from the family and employees of the owner, there having been several cases of sore throat at this place. These cultures were examined microscopically, and all showing diplococcus and streptococcus forms were plated out. There were thirty-four such cultures and from thirty-one of these we isolated bacteria resembling in all respects the Diplococcus pneumoniæ. Pure cultures of these organisms were inoculated subcutaneously into white mice, but were not pathogenic except in three instances.

From one of these thirty-four cultures we obtained a typical streptococcus of the septic sore throat type, it corresponding in most respects to those isolated from cases of the disease and to the organism obtained from the milk. It did not ferment raffinose broth or coagulate milk. This streptococcus did not kill white mice when inoculated in rather large doses. It was obtained from the throat of one of the drivers who himself had not been ill.

CULTURES FROM CASES OF SEPTIC SORE THROAT.

At the laboratory we recovered the Streptococcus epidemicus from two cases, the organism being obtained from the inflamed throat. These were compared with cultures that had been isolated from the peritoneum and from the lymph glands of three other cases of this disease. Two of these latter cultures came from the laboratory of Dr. Charles Simon, while the third was from the Union Protestant Infirmary. These five cultures corresponded to one another in all the essential characteristics. However, both of our organisms acidulated raffinose broth, while one from the lymph gland failed to ferment this medium. Neither of the children from whom we obtained the Streptococcus epidemicus drank milk from the dairy under suspicion and both were probably contact cases, as there were a number of other infected pupils in the schools which these children attended.

INSPECTION OF DAIRY FARMS.

As soon as the milk of any shipper came under suspicion, as determined by pus counts made on samples collected at the railroad stations in Baltimore, an inspector was sent to the dairy farm. Here, as already stated, specimens were collected from each cow for further examination. In addition to this, however, physical examinations were made to determine the presence or absence of garget in the various herds. This resulted in the discovery of several cases of garget on different farms, but these cows, however, were not being used at the time of the inspection. The cow in whose milk we found the enormous number of pus cells failed to show any physical evidence of mastitis; nor was there any other case of garget in this herd. It was from the mixed milk of this shipper, nevertheless, that we were able to recover the Streptococcus epidemicus.

Furthermore a careful inquiry was made on all the dairy farms to determine whether there had been any cases of septic sore throat. This failed to elicit any history of the disease, although one of the shippers stated that he had had several mild attacks of sore throat during the winter season.

CONCLUSION.

From the bacteriological investigation we feel reasonably certain that the outbreak of septic sore throat in Baltimore was largely due to milk that had not been thoroughly pasteurized.

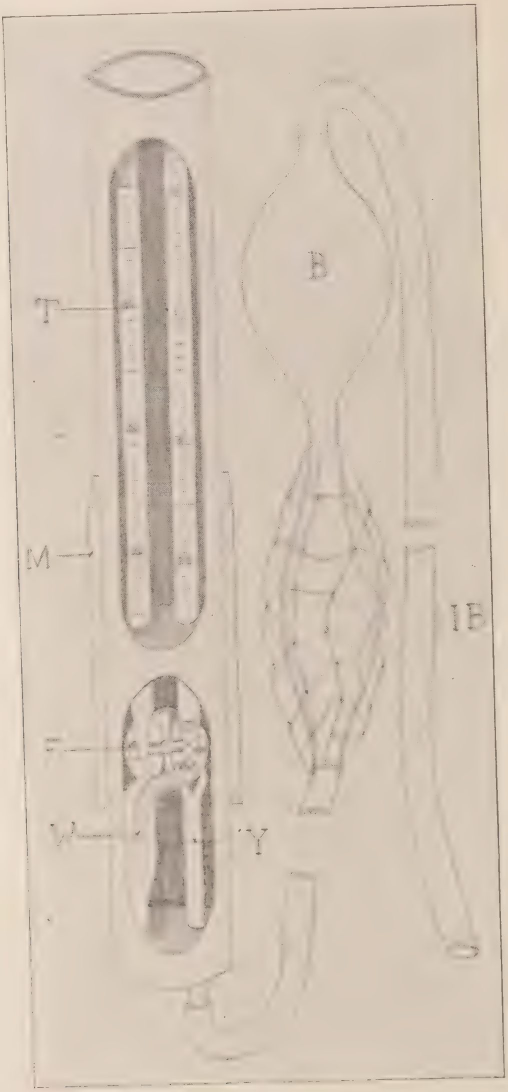
We desire to thank Dr. Frederick C. Blanck and his corps of inspectors for the great assistance they rendered us in this investigation.

A CONVENIENT PSYCHROMETER.

Eugene C. Howe.

Department of Hygiene and Physical Education, Wellesley College.

The figure appended shows a compact apparatus for determining relative humidity. Two thermometers (T) are held in a cylindrical brass case, to the back of which is attached a small clock-spring motor (M) which drives



the Fan (F). B is a cautery-bulb connected with the y-shaped jet (Y). Ventilation of the wet bulb may be accomplished either with fan or with bulb with the same results, though the latter is more fatiguing.

The bulb of the wet-bulb thermometer is prepared in the following way: It is dipped in Japan Gold-size and the surplus wiped off so as to leave an imperceptible layer. Then a leaf of gold or copper foil is applied and on this is deposited a heavy coat of platinum black. Water is led up to the base of the bulb by the wick (W) and from there is spread by the platinum coating aided by a few threads of the wick criss-crossing snugly over the surface of the bulb. A large fraction of the latter is left exposed, however, so that the heat absorbed from the mercury in evaporation may pass promptly to the evaporating layer instead of having to traverse an insulation of fabric. Quick action is thus assured, forty seconds ventilating (with the thermometer used) being sufficient under ordinary conditions to produce a minimum reading, and a minute being ample. There may be other ways of preparing a bulb for prompt delivery of latent heat, but the method described is not so fussy as it sounds.

The instrument is suited to and has been successfully used in places where unobtrusiveness is desired, such as reading rooms, crowded street cars, etc. But under any circumstances there is not the danger of breakage that accompanies the use of the swing-psychrometer, through inadvertant contact with chandeliers, furniture, or human heads.

The cautery-bulb ventilation is suitable for determination of humidity in places not easily accessible to ordinary hygrometers (of the "swing" and other types), such as spaces between clothing. It is then necessary to insert the inlet tube (IB) of the bulb in the place for which the humidity determination is desired. Day bulb readings in such cases are, of course, gotten with a separate thermometer.

Stratified humidity in rooms is easily determinable.

NOTES ON THE EXAMINATION OF SOFT CLAMS FOR POLLUTION.

(*Abstract.*)

STEPHEN DEM. GAGE.

Read before the Laboratory Section, American Public Health Association, Washington, D. C., September, 1912.

The shellfish problem in Massachusetts is quite different from that in most states in the fact that the bulk of the shellfish catch is composed of soft clams. The consumption of these clams is greatest in summer when oysters are out of season, and unlike oysters and hard or Little Neck clams, the soft clams are never eaten without cooking, which fact has to be taken into consideration in determining what degree of pollution may be dangerous.

Systematic examinations of clams from locations of varying degrees of pollution show that while there may be considerable fluctuation in the numbers of bacteria and B. coli at different times, the regular seasonal variation in the bacterial content which has been reported in oysters cannot be detected in the case of soft clams.

A considerable portion of the soft clam catch is shucked and washed before marketing, and bacterial examinations of the liquor of market shucked clams give little indication regarding the original pollution of the areas from which these clams were gathered, although they may yield some information as to the conditions under which the shucked clams have been held. B. coli and similar organisms are frequently found in large numbers in the content of the alimentary canal of such clams, and in such cases pollution at the source is indicated, although the liquor of the shucked and washed clams may be entirely free from B. coli. The suggested "Standard Methods for Examination of Shellfish" make no provision for any tests of the meat, although the meat is the portion which is eaten and only a very small part of the liquor or shellwater upon which tests are usually made is consumed. Such B. Coli tests as have been made at times on the intestines or other portions of the meat are qualitative only, and at best can only indicate pollution without showing the degree thereof. It is quite evident, therefore, that reliable quantitative methods are much needed especially for the examination of "shucked stock."

During 1912 extensive studies of methods for determining the numbers of bacteria in shucked clams have been in progress at the Lawrence Experiment Station. In the method which shows the most promise, a considerable number of clam bodies are ground fine in a sterile meat grinder, and a weighed portion thoroughly mixed with a known volume of sterile water, counts on agar at room temperature, on litmus-lactose agar at body temperature, and fractional tests for B. coli, being made on the mixture. The types of bacteria determined at body temperature do not multiply to any extent under the conditions under which shucked clams are usually kept for market, and counts at this temperature indicate with fair accuracy the condition of the clams at the time they were gathered. The room temperature counts furnish some measure of the conditions under which the clams have been kept and the time which has elapsed since they were shucked, while the B. coli tests yield confirmatory evidence of pollution. The results, expressed as numbers of bacteria per gram, are directly comparable with one another and enable a comparison to be made with the bacterial content of other foods. Using this method of analysis, experiments are in progress to determine the probable danger from the consumption of soft clams from polluted areas after cooking by different methods.

In the "Standard Methods" for examination of shellwater, and of liquor from shucked stock, bacterial counts on agar at both room temperature and body temperature are recommended. Judging from experience in the examination of soft clams, litmus-lactose agar is much to be preferred for the body temperature counts. Careful experiments with sea-water and shellwater from soft clams show that the counts obtained on both agar and litmus-lactose agar at this temperature are practically identical. The use of litmus-lactose agar, however, permits a differentiation between the types of bacteria, which at times is of great assistance in the interpretation of the results.

Attention was called last year to the discordant results which are often obtained in the bacterial counts on sea-water and shellwater of clams and oysters, these being attributed to the destruction of the bacterial cells by osmosis through the sudden change in salinity by dilution with fresh water during plating. Experiments have shown that errors from this source are considerably reduced if all dilutions are made in a one-per cent. solution of common salt instead of in fresh water. Furthermore, higher and much more uniform counts are obtained on both agar and litmus-lactose agar if one per cent. of salt be added to these media when making plates of sea-water or of shellfish samples.

THE SOURCE OF AMMONIA AND NITRITES IN A NITRATE-PEPTONE SOLUTION.

I. J. Kligler,
Department of Public Health, American Museum of Natural History, New York.

Read before the Laboratory Section, American Public Health Association, Washington, D. C., September, 1912.

The reduction of nitrates has been considered for some time a valuable test in the recognition of certain types of organisms. The presence of either nitrites or ammonia in a solution of nitrate peptone broth is taken as an index of such reduction, both of these radicals being supposed to be formed by the breaking down of the nitrates. This assumption is apparently made by Gorham who recommends the use of a tap water solution of peptone nitrate broth incubated for 7 days at 20° C in order "To determine the power of certain bacteria to reduce nitrates to nitrites and ammonia." Park gives directions for the testing of ammonia and nitrites in a nitrate bouillon broth in order to determine nitrate reduction. Winslow and Winslow in their study on the cocci go a step further in assuming that ammonia may be formed by the reduction of nitrates directly without nitrites being present at all. They used standard nitrate solution, containing peptone and "tested for nitrites and ammonia in the regular way." Further on they state that "apparently some of the cocci produce ammonia in peptone nitrate broth medium without formation of nitrites."

The writers go on to say:

"It was thought at first that this difference might be due to the fact that different strains carried out, more or less completely, a reduction, first from nitrates to nitrites and then from nitrites to ammonia. A special study was made of this point, by inoculating a series of tubes with certain selected cultures and examining one tube a day for two weeks, and by inoculating large flasks of nitrate medium and withdrawing portions for examination at intervals for three weeks. These experiments showed that in some cultures nitrites appeared first, while both nitrites and ammonia were found on succeeding days. With other cultures nitrites alone were found, and with still others the ammonia test alone was positive, day after day. Apparently some of the cocci produce ammonia in the peptone-nitrate medium without the formation of nitrites. In a very careful study of the action of sewage bacteria upon nitrates, Gage (1905) has shown that the direct reduction of nitrates to ammonia without the intermediate production of nitrites is unquestionably accomplished by certain forms."

All through there is the consistent assumption that the ammonia must come ultimately from the nitrate present. The new report on Standard

Methods of Water Analysis (1912) does recognize that ammonia may be formed from the organic matter of the medium and not from the nitrates. In order to decide this point it is suggested that a broth culture should be tested for ammonia and the result compared with that obtained from the nitrate broth. In view of the marked differences in growth between a broth culture and one in a nitrate peptone solution, this procedure seems of somewhat doubtful value. The assumption that ammonia is formed by the reduction of nitrites seems to be based very largely on the work of Maassen who after a series of careful experiments arrives at the conclusion that "in peptone free solutions the formation of ammonia follows that of nitrites as the second phase in the nitrogen assimilation process." Jordan states that "the ability to reduce nitrates to nitrites and ammonia is a widespread bacterial characteristic; Maassen who investigated 109 kinds of bacteria found 85 to possess this power." This implies that the 85 could reduce nitrates to nitrites and ammonia, whereas, as will be seen later this series of 85 gave positive tests for nitrites, with no ammonia test recorded. Hiss and Zinsser base a similar statement on the work of Maassen. Maassen's experiments fall into three groups. He first tested 109 organisms in pepton nitrate solutions and found 85 showing positive nitrite tests. In his second series he tried to determine the ability of the organisms to reduce nitrites. He found that the organisms will live only in the presence of minute amounts of nitrites and that 59 out of 109 gave no reduction of nitrites although 41 of the 59 were able to reduce nitrates. The other 50 showed a diminution of nitrites and to see whether ammonia was the end product to be incubated 27 organisms in media free from organic nitrogen, using potassium nitrate and carbohydrates as nitrogen and carbon sources respectively. After four weeks incubation he found on distilling his solutions over caustic soda five distinct positive ammonia tests and slight traces in a number of the others.

From the results of these experiments, he arrives at the conclusion that in peptone free media the nitrates are broken up with the eventual formation of ammonia. It seems possible however, that distillation may cause the breaking down of weak nitrogenous organic compounds, formed in the solutions as a result of bacterial metabolism, with the liberation of ammonia. Furthermore the fact that Maassen obtained ammonia in peptone free media after four weeks incubation does not justify us in assuming that ammonia found in a peptone nitrate solution after 10 days incubation is an index of nitrate reduction. Gerlach and Vogel tested a number of organisms in solutions where nitrates were the only sources of nitrogen and found that the nitrates were reduced to nitrites. Later the nitrites disappeared and a determination of total nitrogen showed a loss of nitrogen although throughout the entire series no ammonia could be detected.

The only quantitative work I have been able to find is that by Gage, who finds what he calls ammonia from nitrates in 5 out of 20 cases and ammonia from peptone solution in 18 out of 20. He determined his nitrate ammonia, however, in an indirect way which makes the results of doubtful value. He determined the ammonia in a peptone solution and that in a nitrate peptone solution and subtracting obtained the amount of ammonia derived from nitrate reduction. Of the 5 so-called positive cases two showed ammonia far in excess of the amount of nitrates reduced. Considering that we are dealing with biologic experiments, that the growth of the same organism in two different solutions (peptone and nitrate peptone) is not necessarily uniform, and that the reactions within the culture tube are as yet unknown to us, this is a somewhat slender proof that the ammonia is derived from nitrates.

In the course of a study of the nitrate reducing power of the cocci, I observed as did the Winslows that in some cases, notably among the saprophytic yellow cocci and sarcinæ ammonia alone and no nitrites was produced. Repeated tests confirmed these observations. The work presented in this paper is the result of an attempt to determine the exact source of the ammonia.

Fifty-four strains of cocci, thirty-five of which showed reduction of the standard peptone nitrate solution to nitrites, ammonia or both, were inoculated into solutions of 1% peptone broth and nitrate-peptone broth respectively. The solutions were at first made up with tap water according to standard methods. Each strain was inoculated into five tubes of each of the two solutions and incubated with controls for 7 days at 20° C. The tubes were then tested by standard methods for nitrites and ammonia. The two sets of tubes were compared with their respective controls and each other and the results recorded as:

(1), + (better in peptone solution)
(2), + (better in nitrate-peptone solution)
(3), + (same in both solutions)
(4), − (negative in both solution)

The first series of tests showed the presence of nitrites in the peptone solution to which no nitrate was added, in every one of the 18 cases in which nitrites were formed in the nitrate solution. The test was therefore repeated in solutions made up with distilled water to which inorganic salts were added. The solutions were made up as follows:

(1) Peptone solution

H_2O	1000 C. C.
Peptone	10 gms.
K_2HPO_4	.2 "
$MgSO_4$	.1 "
NaCl	.2 "

(2) Nitrate solution

Same as above with addition of

KNO_3 .2 gm.

All the salts added were chemically pure.

While some of the organisms did not grow quite so well in this solution, the results obtained were very striking. The organisms tested grouped themselves into four classes: (a) those that produced nitrites only; (b) those producing ammonia only; (c) those producing ammonia and nitrites; (d) those producing neither ammonia nor nitrites. All organisms producing nitrites only, gave a positive test for nitrites in the nitrate-peptone solution, and a negative one in the peptone solution, Those that produced both nitrites and ammonia showed nitrites and ammonia positive in the nitrate peptone solution, while in the peptone, the nitrite was negative and ammonia positive. Those that produced ammonia only, gave positive tests for ammonia in both solutions and negative tests for nitrites in both. Non-reducers gave negative results in both solutions. In the majority of cases the amount of ammonia produced by an organism was the same in the two solutions. As was to be expected some showed stronger in the peptone solution while others gave stronger reactions in the nitrate solutions. The results are summarized in the following tables:

TABLE I.

PRODUCTION OF AMMONIA AND NITRITES IN PEPTONE AND NITRATE PEPTONE BROTH.

Type	No. of Cultures	Ammonia produced in		Nitrites produced in	
		Peptone	Peptone-Nitrate broth	Peptone broth	Peptone-Nitrate broth
A	5	−	−	−	+
B	17	+	+	−	−
C	13	+	+	−	+
D	19	−	−	−	−

TABLE II

AMMONIA PRODUCTION IN PEPTONE AND NITRATE PEPTONE BROTH.

Type	Total No. in each	Better in		Equally good in both
		Peptone broth	Nitrate peptone broth	
A	5	0	0	0
B	17	4	3	10
C	13	3	1	9
D	19	0	0	0

Table I brings out very clearly the source of both the nitrites and the ammonia. The former is evidently the result of the breaking down of the nitrates, while the latter is evidently derived from the peptone. The differences observed in the two solutions as shown in table II are attributable to the non-uniformity of conditions which prevail in this as in any other biological experiment.

SUMMARY AND CONCLUSION.

1. Fifty-four strains of cocci were tested in peptone and nitrate peptone solution in order to determine the source of nitrites and ammonia.
2. The results show that the organisms tested reduced nitrates to nitrites only.
3. The ammonia was apparently the result of the breaking down of the peptone and not an end product in the reduction of nitrates.
4. The cocci generally do not reduce the nitrates in a nitrate-peptone solution to ammonia. A study of the literature leads me to believe that this is very possibly equally true of other bacteria. While there may be organisms that reduce nitrates to nitrites and eventually to ammonia under certain conditions, and while this may even be possible in the standard peptone-nitrate broth, we are not justified in assuming that the presence of ammonia in peptone-nitrate broth signifies nitrate reduction.*
5. The peptone-nitrate solution should be made up with distilled instead of tap water as recommended in the Standard Methods, as the presence of nitrate impurities in the latter will often seriously vitiate the tests.

In conclusion I wish to express my gratitude to Prof. Winslow for his help in the preparation of this paper.

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* Since this paper was written G. Harold (Annual Report (1911) of the Director of the Department of Marine Biology, Carnegie Inst.) has reported the existence of strong denitrifying organisms in tropical sea water which possess the power of producing nitrites, ammonia and free N. in a solution of salt water, calcium malate, sodium acid phosphate and potasium nitrate.

ADDENDA TO DR. JOHN S. FULTON'S ARTICLE ENTITLED "THE MEDICAL STATISTICS OF SEX HYGIENE; SUCH AS THEY ARE," WHICH APPEARED IN THE JUNE JOURNAL, P. 661.

The recently published Abstract of the Thirteenth Census enables me to correct the figures in my paper on the medical statistics of sex-hygiene. When my paper was written, the age, sex, and marital distributions of population, for the year 1910, were not available. I obtained the distinction for sex by taking half, and that for ages above 15 by taking two-thirds of the populations. The differences of sex and age distribution, under urban and rural conditions, were ignored, as unlikely to cause any important error.

The Census bulletin quoted in my paper has been corrected in the Abstract as to the number of places included in the urban population. Three cities, Texarkana, Union City, and Bristol, were counted twice in the bulletin, giving 2176 cities, instead of 2173, in the seventh class. This reduces the total number of cities to 2402, and together with other corrections reduces Dr. Willson's total of 2,177,400 prostitutes to a total of 2,172,600.

In the table printed on the following page, I have lumped three urban groups, the fourth, fifth and sixth, into one group of 210 cities. I am not sure about my figures for the seventh group. I am not industrious enough to sum the female populations of 2173 cities, and I doubt if the Census Abstract accounts for them all. There are enough numerical discrepancies in my paper to afford good sport to any one who has a passion for unscrambling eggs. The best of these errors is in the proportion of married females.

Comparing this table with my former table, it will be found that six rates are diminished and four are augmented. Their effect on my criticism of Dr. Willson's reasoning is unimportant. In the light of these corrections I can say that his low guess, applied to the 44,639,989 females in the United States, would give 607,104 prostitutes, public and clandestine. His high guess would give as few as 11,356,413. Quite a range! Under the terms of his "ultraconservative" average (1424), the average man can believe, with all the enthusiasm of a 71 per cent. probability, that he is the father of his son and the son of his father. He can cherish a 43 per cent. probability that his mother, his wife, one sister, and one daughter are all virtuous. For the average citizen of the seventh class city, the faith that he is the father of his son and the son of his father can be rationally supported by assuming a 70.66 per cent. probability that his father was, and his son will be, only half as fortunate. Perhaps Dr. Willson did not mean to say such things, but such is the meaning of what he said.

	Population, 1910.	Prostitutes, public and clandestine.	Females, all ages.	Rate per 10,000 females.	Females above 15.	Rate per 10,000 females above 15.
3 cities	8,501,174	84,000	4,232,465	198	3,041,850	276
6 "	3,427,579	50,000	1,683,861	297	1,240,446	403
10 "	3,532,927	24,000	1,760,923	136	1,206,365	199
210 "	13,082,136	276,200	6,621,364	417	4,767,362	579
2,173 "	14,079,567	1,737,400	6,828,488	2,544	4,917,510	3,533
2,402 "	42,623,383	2,172,600	21,127,202	1,029	15,333,853	1,424

John S. Fulton.

Baltimore, July 25, 1913.

PRELIMINARY ANNOUNCEMENT OF THE COLORADO SPRINGS MEETINGS.

September 9–13, 1913.

· OFFICIAL CALL

July 1, 1913.

The Forty First Annual Meeting of the American Public Health Association will be held at Colorado Springs, Col., from September 9th to 13th. The programs for the General Sessions of the Association, as well as those of the Sections, are well advanced and promise to be timely, interesting and progressive.

The location of Colorado Springs is geographically favorable to a large part of the membership and it is therefore hoped that the attendance will be large and that the attending members may thoroughly discuss the important subjects to be presented.

The two sections recently created have elaborated comprehensive programs and it is expected that they will elicit as valuable discussions as do the older sections.

It is also expected that the local committee will add to the enjoyments of the meeting by facilitating numerous excursions into the beautiful environment, which holds the reputation as being one of the prominent health resorts of the continent.

Rudolph Hering,
President.

PRELIMINARY PROGRAM FOR THE GENERAL SESSIONS

OFFICERS 1912–1913.

President, Mr. Rudolph Hering, New York, N. Y.
First Vice-President, Dr. W. R. Batt, Harrisburg, Pa.
Second Vice-President, Dr. James Roberts, Hamilton, Ont.
Third Vice-President, Dr. J. E. Monjaras, Mexico, D. F., Mexico.
Secretary, Prof. Selskar M. Gunn, Boston, Mass.
Treasurer, Dr. Livingston Farrand, New York, N. Y.

Symposium on the Control and Improvement of Food Supplies.

The Function of Federal Authorities. Dr. Carl Alsberg, Bureau of Chemistry, Department of Agriculture, Washington, D. C.

The Function of State Authorities. Mr. H. E. Barnard, State Board of Health, Indianapolis, Ind.

The Function of Municipal Authorities. Dr. Ernst J. Lederle, Commissioner of Health, New York City.

PRESIDENT RUDOLPH HERING, D. Sc.

The Function of Voluntary Organizations. Mr. Bailey B. Burritt, Department of Social Welfare, A. I. C. P., New York City.

The Role of Controlled and Guaranteed Advertising. Mr. Richard H. Waldo, Good Housekeeping Magazine, New York City.

The Reappearance of the Ghost of Malthus. Professor William T. Sedgwick, Massachusetts Institute of Technology, Boston, Mass.

Self Imposed Supervision by Organized Industries. Dr. H. D. Pease, New York City.

Transportation of Food Products: A Pressing Health Problem. Dr. Peter H. Bryce, Department of Immigration, Ottawa, Canada.

Public Health Aspects of the Candy Industry. Professor Samuel C. Prescott, Massachusetts Institute of Technology, Boston, Mass.

Industrial Lead Poisoning. Dr. Alice Hamilton, Hull House, Chicago, Ill.

Occupational Diseases and Legislative Remedies. Dr. John B. Andrews, American Association for Labor Legislation, New York City.

Industrial Hygiene, A Neglected Field of Public Health. Dr. C. T. Graham-Rogers, State Department of Factory Inspection, New York City.

Good Illumination, An Important Factor in Public Health and Safety. Mr. Clare N. Stannard, Denver, Colo.

The Venereal Problem. Dr. J. H. Landis, Health Officer, Cincinnati, Ohio.

The Health Department and the Control of Venereal Diseases. Dr. R. L. Dixon, Secretary, State Board of Health, Lansing, Mich.

Hindrances to the Extension of Uniform Methods for Vital Statistics in the United States. Dr. Cressy L. Wilbur, Bureau of the Census, Washington, D. C.

The Mortality from Cancer in the United States and Foreign Countries. Mr. F. L. Hoffman, Prudential Insurance Company, Newark, N. J.

Why are Modern Infectious Diseases Mild? Dr. H. W. Hill, Director, Institute of Public Health, London, Ont.

The Public Health Nurse. Dr. Guy L. Kiefer, Health Officer, Detroit, Mich.

Co-operation and Efficiency in Rural Health Work. Mr. John Ritchie, Jr., Massachusetts Institute of Technology, Boston, Mass.

Modern Methods of Fly Fighting. Dr. E. C. Levy, Chief Health Officer, Richmond, Va.

The Present Status of Pasteurization. Mr. S. H. Ayers, Bureau of Animal Industry, Washington, D. C.

The Future of Milk Industry. Dr. Francis E. Fronczak, Health Officer, Buffalo, N. Y.

An Investigation into the Relationship of Indoor Temperature and Humidity in the Winter to Infant Mortality from Respiratory Diseases. Dr. Donald B. Armstrong, Department of Social Welfare, A. I. C. P., New York City.

Infant Blindness and the Midwife Problem. Miss C. C. VanBlarcom, New York Association for the Blind, New York.

Yellow Fever in Mexico. Dr. Eduardo Liceaga, Superior Board of Health, Mexico City, Mex.

Cremation vs. Earth Burial, from a Sanitary Standpoint. Dr. E. A. Carr, State Board of Health, Lincoln, Neb.

Relationship of Public Health Work to Race Degeneracy. Dr. J. A. Kellogg, Battle Creek, Mich.

Public Health Administration, as a Layman Views It. Dr. George H. Heald, Washington, D. C.

Sanitation in Cuba: Its Progress. Dr. Jorge LeRoy, Havana, Cuba.

Practical Points in Railway Sanitation. Dr. A. E. Campbell, Health Officer, Illinois Central R. R., Chicago, Ill.

This list is still incomplete as several other important contributions have been promised but exact titles have not been received in time to include in the preliminary announcement.

All communications with regard to the program for the General Sessions should be addressed to the Secretary, Selskar M. Gunn, 755 Boylston Street, Boston, Mass.

PRELIMINARY PROGRAM OF THE LABORATORY SECTION

Chairman, Prof. F. P. Gorham,
Providence, R. I.
Vice-Chairman, Prof. Edward Bartow,
Urbana, Ill.
Recorder, Dr. A. W. Freeman,
Richmond, Va.
Secretary, Dr. D. L. Harris,
St. Louis, Mo.

Observations on the Incubation time for Diphtheria Cultures for Diagnosis. Henry Albert, Professor of Pathology and Bacteriology, University of Iowa, Iowa City.

The Antirabic Service of the Hygienic Laboratory for the Past Five Years. J. F. Anderson, Director Hygienic Laboratory, Washington, D. C.

The Value of Routine Water Analyses in Sanitary Surveys. H. E. Barnard, State Food and Drug Commissioner, Indianapolis, Indiana.

Condition of Wash Water. L. A. Fritze, Filtration Plant, Moline, Illinois

Upon the Determination of Minute Quantities of Nitrates Particularly in Potable Waters. A. H. Gill, Mass. Institute of Technology, Boston.

(1) Further Experiments on Antirabic Immunization. (2) Effect of Temperature and Light upon Vacuum Dried Bacteria. (3) Report of an Outbreak of Diphtheria. D. L. Harris, St. Louis, Missouri.

A Protest Against the 37°C. Standard of Agar for Use in Water Analysis. H. W. Hill, London, Ontario.

A Serious Fallacy of the Standard Methyline Blue Putrescibility Test. Arthur Lederer, Sanitary District of Chicago.

Methods for Examination of Clarifier Milk Slime. Charles E. North, 30 Church St., New York City.

Study of the Swimming Pool with a Return Purification System. John F. Norton, Massachusetts Institute of Technology, Boston.

Rational Basis for the Sanitation of Rivers and Harbors. George A. Soper, Metropolitan Sewerage Commission, New York City.

Some Comparisons Between the 20° and 37° Plate Counts for Enumerating Bacteria in Water. J. Bosley Thomas and Edgar A. Sandman, Water Department, Baltimore, Md.

The Effect of Renovation of Butter Upon the Reichert Meissl Number and Saponification Value. F. O. Tonney and F. W. Stockton, Department of Health, Chicago, Illinois.

Report of Committee on Standard Methods for the Preparation of Tuberculin Mallein. A. Parker Hitchens, Glenolden, Pa.

(1) Concerning Complement Splitting. (2) Further Studies Upon the Effect of Single and Mixed Typhoid Vaccines Upon Agglutinin Formation in Rabbits. A. Parker Hitchens and George Hansen, Glenolden, Pa.

The Counting of Bacteria on Surfaces. Adolph Gehrmann, Bacteriologist, The Columbus Laboratories, Chicago, Illinois.

Bacteriological Methods for Meat Analysis. John Weinzirl and E. B. Newton, University of Washington, Seattle.

The Number of Bacteria in Hamburger Steak. John Weinzirl and E. B. Newton.

A Rapid Method for the Bacteriological Determination of Manural Pollution in Milk. John Weinzirl and Milton V. Velder.

The Destruction of Bacterial Spores by Sunlight. John Weinzirl.

Papers have also been promised from W. Dreyfus, F. P. Gorham, H. C. Hamilton and others.

All communications from members with regard to the program for this section should be addressed to the Chairman of the Program Committee, Prof. Edward Bartow, University of Illinois, Urbana, Ill.

PRELIMINARY PROGRAM OF THE SECTION ON VITAL STATISTICS

Chairman, Dr. W. S. Rankin,
Raleigh, N. C.
Vice-Chairman, Dr. J. E. Monjaras,
Mexico, D. F., Mexico.
Secretary, Mr. David S. South,
Trenton, N. J.

1. Introductory Remarks by the Chairman. Dr. W. S. Rankin, Raleigh, N. C.
2. Election of Nominating Committee.
3. Nomination of New Members by the Committee on Membership. Dr. E. Arthur Carr, Chairman, Lincoln, Neb.
4. The Report of the Committee on Classification of Non-Resident Deaths. Prof. Walter F. Wilcox, Chairman, Cornell University, Ithaca, N. Y.
5. Report of Committee on Statistical Methods in Regard to Occupational Mortality. Dr. William F. Snow, Chairman, Sacramento, Cal.
6. Report of the Committee on the Subject of Defining, Registering, Recording, and Tabulating Stillbirths. Dr. Charles V. Chapin, Chairman, Providence, R. I.
7. Report of Committee on Forms and Methods of Statistical Practice and Tables. Prof. Walter F. Wilcox, Chairman, Cornell University, Ithaca, N. Y.
8. Report of Committee on Legislation: Dr. William C. Woodward, Chairman, Health Department, Washington, D. C.
9. Report of the Committee on Resolutions. Dr. William H. Guilfoy Chairman, Health Department, New York City.
10. Corrected Death Rates. Dr. Cressy L. Wilbur, Bureau of the Census, Washington, D. C.
11. The Popularization of Vital Statistics. Dr. William A. Evans, Chicago, Ill.
12. Uniformity in the Annual Reports of Local Boards of Health. Mr. Frederick L. Hoffman, Prudential Insurance Company, Newark, N. J.
13. Institutional Statistics, Possible Values and Methods of Collection. Dr. Charles F. Bolduan, Health Department; New York City.
14. Method of Collection and Value of Morbidity Statistics. Assistant Surgeon General J. W. Kerr, United States Public Health Service, Washington, D. C.
15. A Statistical Study of Measles. Mr. Frederick Crum, Prudential Insurance Company, Newark, N. J.

16. Methods for Securing Accuracy in the Registration of Causes of Death. Dr. Wilmer R. Batt, Department of Health, Harrisburg, Pa.
17. A Statistical Study of Infant Mortality. Mr. Edward Bunnell Phelps, Editor, American Underwriter, New York City.
18. Possibilities of Official Interference with the Mortality of the Higher Age Groups. Dr. Lee K. Frankel, Metropolitan Life Insurance Company, New York City.

There will be a joint session with the Section of Public Health Officials,

All communications from members with regard to the program for this section should be addressed to the Chairman of the Section, Dr. W. S. Rankin, State Board of Health, Raleigh, N. C.

PRELIMINARY PROGRAM OF THE SECTION OF PUBLIC HEALTH OFFICIALS

Chairman, Dr. P. M. Hall,
Minneapolis, Minn.
Vice-Chairman, Dr. John H. Landis,
Cincinnati, Ohio.
Secretary, Dr. E. C. Levy,
Richmond, Va.
Recorder, Dr. A. S. Fell,
Trenton, N. J.

Modern Health Administration; An Analysis. Oscar Dowling, M. D., President Louisiana State Board of Health.

The Value of the Laboratory as an Aid in the Diagnosis of Infectious Diseases. Guy L. Kiefer, M. D., D. P. H., Health Officer, Detroit, Mich.

(1) The Infectious Diseases of Eight Thousand Children. (2) The Non-Identity of Biblical and Modern Leprosy. (An original study.) H. W. Hill, M. D., D. P. H., Institute of Public Health, London, Ontario.

The Hospital Treatment of Infectious Diseases in the Municipality. George W. Goler, M. D., Health Officer, Rochester, N. Y.

How Can We Best Control Our Milk Supply? Charles J. Hastings, M. D., M. O. H., Toronto, Canada.

Methods of Determining the Source of an Epidemic of Typhoid Fever. Joseph S. Neff, M. D., Department of Public Health and Charities, Philadelphia, Pa.

Vital Statistics in Some Municipal Reports. Cressy L. Wilbur, M. D., Chief Statistician, Bureau of the Census, Washington, D. C.

Drug Habitués and Their Bearing upon the Public Health and Welfare. Charles E. Terry, M. D., Health Officer, Jacksonville, Florida.

The Routine of Medical Inspection of Schools in Boston. W. J. Gallivan, M. D., Chief, Division of Child Hygiene, Boston Health Department, Boston, Mass.

Control of Communicable Diseases. Powhatan S. Schenck, M. D., Health Commissioner, Norfolk, Va.

Publicity: Some Observations on Its Uses and Misuses. J. Scott MacNutt, Orange, N. J.

There will be a joint session with the Section on Vital Statistics.

Other important papers are also promised.

COMMITTEE REPORTS

The following committees have already signified their intention of presenting reports:

Committee on Foods, including Milk and Water. Charles J. Hastings, M. D., M. O. H., Toronto, Canada, Chairman.

Committee on Study and Prevention of Communicable Diseases. Francis George Curtis, M. D., Chairman, Board of Health, Newton, Mass., Chairman. This report will be on the detection and control of diphtheria carriers.

Committee on Industrial Hygiene and Sanitation of the Home. J. H. Landis, M. D., Health Officer, Cincinnati, Chairman.

It is expected that other committees will also make reports.

All communications from members with regard to the program for this section should be addressed to the Chairman of the Program Committee, Dr. J. H. Landis, Health Officer, Cincinnati, Ohio.

PRELIMINARY PROGRAM OF THE SANITARY ENGINEERING SECTION

Chairman, Col. J. L. Ludlow,
Winston-Salem, N. C.
Vice-Chairman, Mr. R. S. Weston,
Boston, Mass.
Secretary, Dr. H. D. Pease,
New York, N. Y.
Recorder, Prof. G. C. Whipple,
Cambridge, Mass.

In the Sanitary Section the time allotted will be devoted chiefly to reports and papers presented by members of the committees on Air Supplies, Water Supplies, Sewage Collection and Disposal, Refuse Collection and Disposal, River Cleaning and Street Cleaning, respectively.

The Committee on Air Supplies, of which Prof. William T. Sedgwick of the Massachusetts Institute of Technology is chairman, has arranged for papers as follows:

Some Fundamental Physical Factors in the Problem of the Control of the Atmospheric Environment. Professor E. B. Phelps, Boston, Mass.

Factory Ventilation in New York State. Dr. C. T. Graham-Rogers, New York City.

School Ventilation in New York City. Professor C.-E. A. Winslow, New York City.

An Experiment with Ozone in School-room Ventilation. Professor F. H. Bass, Minneapolis, Minn.

Some Preliminary Studies in Air Washing and its Results. Professor G. C. Whipple and Mr. M. C. Whipple, Cambridge, Mass.

Investigations on Ventilation. Mr. D. D. Kimball, New York City.

The Committee on Water Supplies, of which Mr. George W. Fuller is chairman, has prepared a very valuable report on the Status of Water Purification, and the following gentlemen have been asked to take part in the discussion of certain timely topics, as follows:

Hygienic Aspects. Dr. Dowling, Louisiana State Board of Health, and Dr. Levy, Richmond, Va.

Sterilization. Mr. H. W. Clark, Boston, Mass., and George A. Johnson, New York City.

Economies of Over-dosing of Coagulants. Mr. E. E. Lochridge, Springfield, Mass.

Water Softening and Decolorization. Mr. W. A. Sperry, Grand Rapids, Mich.

Corrosion of Metals. Prof. W. H. Monfort, St. Louis, Mo., and Dr. Frank E. Hale, Mount Prospect Laboratory, Brooklyn, N. Y.

The Committee on Sewage Collection and Disposal, of which Mr. G. S. Webster, chief engineer of the Bureau of Surveys, of Philadelphia, is chairman, will present a series of papers on some important aspect of the subject.

The Committee of Refuse Disposal, of which Mr. Samuel A. Greeley, consulting engineer, is chairman, is collecting statistics regarding municipal refuse disposal, for presentation at the meeting. Besides this, papers will be presented: (1) "How Shall Public Officials Proceed to Secure the Most Permanent and Satisfactory Improvement of their Local Refuse Collection and Disposal Problem?" (2) "What is Your Experience as to the Best Methods of Refuse Collection as Regards Equipment, Operation and Organization?"

There will also be a paper by Col. Morse on "Refuse Collection."

The Committee on River Cleaning, of which Prof. G. C. Whipple of Harvard University is chairman, will present a report, and is arranging a symposium on state control of stream pollution to be participated in by engineers of State Departments of Health.

The Committee on Street Cleaning, of which Mr. Samuel Whinery, consulting engineer, is chairman, has arranged for the following papers:

The Recoverable Values of City Refuse. Mr. George H. Norton.
Advantages and Disadvantages of Night Collection. Mr. Wm. H. Edwards.
Advantages and Disadvantages of Disposing of the Different Kinds of Refuse by Contract or Permanently Employed City Labor. Mr. R. C. Harris.
Municipal versus Contract Street Cleaning in Washington, D. C., and Analyses of Cost-keeping as applied to Municipal Management of Street Cleaning. Two papers. Mr. J. W. Paxton.
Recent Progress in Methods and Character of Street Cleaning. Mr. S. Whinery.

In addition to the papers secured by the Committees, there will be several other papers on miscellaneous sanitary engineering subjects. There will be one on the "Prevention of Mosquito Breeding in Storm-water Catch-basins" by Mr. Edwin S. Kastenhuber, Jr., of Vineland, N. J.

All communications from members with regard to the program of this section should be addressed to the Chairman of the Program Committee, Mr. Robert S. Weston, 14 Beacon Street, Boston, Mass.

PROGRAM OF THE SOCIOLOGICAL SECTION

Chairman, Mr. Homer Folks,
New York City.
Vice-Chairman, Dr. H. E. Dearholt,
Milwaukee, Wis.
Secretary, Mr. S. Poulterer Morris,
Denver, Colo.

First Session

General Topic

Sociological Aspects of Recent Reorganizations of Health Departments.

1. Cleveland, Ohio. Dr. R. H. Bishop, Jr., Secretary, Anti-Tuberculosis League of Cleveland, Ohio,
2. Minneapolis, Minn. Mr. Frederic Bass, Director of Laboratory, Minnesota State Board of Health, Minneapolis, Minn.
3. New York State Health Department. Mr. John A. Kingsbury, Assistant Secretary of State Public Health Commission, New York City.

SECOND SESSION

General Topic
Securing Funds for Public Health Work.

1. From Public Authorities on the Theory of Representative Government. Mr. Lawrence Veiller, Director of the Department for Improving Social Conditions, Charity Organization Society, New York City.
2. From Public Authorities by Referendum.
    - (a) For the Cook County Tuberculosis Hospital. Mr. Frank E. Wing, General Superintendent, Municipal Tuberculosis Sanitarium, Chicago, Ill.
    - (b) For the Seattle Tuberculosis Hospital. Dr. John Weinzirl, Bacteriologist, University of Washington, Seattle, Wash.
    - (c) For the St. Lawrence (N. Y.) County Hospital. Mr. George J. Nelbach, Assistant Secretary, Tuberculosis Committee, State Charities Aid Association, New York City.
    - (d) For the Winnebago County Tuberculosis Hospital. Mr. Otto F. Bradley, Assistant Secretary, Wisconsin Anti-Tuberculosis Association, Milwaukee, Wis.
3. From Private Sources.
    - (a) Private Funds for Public Health. Mr. John M. Glenn, Director, Russell Sage Foundation, New York City.
    - (b) The Anderson Memorial. Mr. Albert G. Milbank, Vice-President, New York Association for Improving the Condition of the Poor, New York City.

THIRD SESSION

General Topic
Some Economic Aspects of Health.

1. Health and Charity. Prof. Selskar M. Gunn, Massachusetts Institute of Technology, Boston.
2. Insurance Companies and Public Health Activities. Dr. Lee K. Frankel, Metropolitan Life Insurance Company, New York City.
3. Importance of Securing Adequate Remuneration for Physicians in Health, Dispensary and Hospital Work. Dr. Charles P. Emerson of Indianapolis, Ind.
4. Newer Aspects of Public Health Education. Dr. H. S. Dearholt, University of Wisconsin, Milwaukee, Wis.

In preparing the above program of the sociological section it has been deemed more important to have the papers written by those with special qualifications and knowledge, than to insist that those announced should agree to read the papers in person. All the papers above mentioned are definitely promised, but in some instances they will be read by other persons than the writers.

All communications from members with regard to the program for this section should be addressed to the Chairman of the Section, Mr. Homer Folks, 104 East 22d Street, New York City.

ENTERTAINMENTS.

The Local Committee has been busily engaged in arranging a pleasant program of entertainments. The program as planned at the present time is as follows:—September 9th, Reception and Smoker at the Chamber of Commerce Building; September 10th, Ball at Antlers Hotel; September 11th, Jungle Party and Barbecue at mouth of Cheyenne Canon; September 12th, Automobile Ride through the Garden of the Gods, Glen Eyrie and to the Modern Woodmen Sanatorium, where Doctor Rutledge, the Superintendent, will serve dinner.

In addition to the above, the Local Committee are planning to arrange special entertainments for the ladies accompanying members.

COMMITTEE MEETINGS.

The Committee of Seven, the Executive Committee and Committee on Membership will meet on Monday, September 8th. The members of these various Committees will receive due notice with regard to the hours and place where these meetings will be held.

TRANSPORTATION.

On account of the relatively small number of members and the fact that they come from all sections of the country, it is impossible to get special concessions from the railroads (with the exception of the Trans-continental Passenger Association.) However, summer excursion rates which are now in effect make travel to Colorado very reasonable. The agents in your city will be able to give you full information with regard to rates, accommodations, etc.

TRANS-CONTINENTAL PASSENGER ASSOCIATION.

The trans-continental lines have individually announced special fares from California and North Pacific Coast Points for conventions and meetings. Tickets will be sold from North Pacific Coast Points daily up to September 30th and from California Points August 20, 21, 22, 26, 27, and 28, September 2, 3, 4, 5, 8, 9, 10, and 11. Fares to Colorado Springs via direct routes from California common points and North Pacific Coast

HOTEL ACCOMMODATIONS

Name of Hotel	No. of Rooms	European Plan				American Plan			
		Single Room without Bath	Single Room with Bath	Double Room without Bath	Double Room with Bath	Single Room without Bath	Single Room with Bath	Double Room without Bath	Double Room with Bath
Colorado Springs									
Acacia	140	$1.50–$2.00	$2.50–$3.00	$2.50–$3.00	$4.00–$6.00		European Only		
Alta Vista	100	1.00– 1.50	1.50– 2.50	2.00– 2.50	3.00– 4.00				
Antlers	250	1.50– 2.00	3.00– 3.50	3.00– 4.00	5.00– 6.00		European Only		
Elk	50	1.00 and up	1.50 and up	1.50 and up	2.50 and up		European Only		
Joyce	50	1.00– 1.50	2.00– 2.50	2.00– 2.50	3.00– 4.00		European Only		
Plaza	120	1.00– 1.50	2.00– 2.50	1.50– 2.50	3.00– 3.50		European Only		
Rex	60	1.00		1.50					
Spaulding House	50	.75– 1.00		1.00– 2.00					
Manitou									
Cliff House	200	American Only				$3.00	$4.00–$6.00	$6.00	$8.00–$12.00
Grand View	110	$1.00–$1.50	$2.00–$3.00	$2.00–$3.00	$3.50–$4.00	2.50–$3.00	4.00– 5.00	5.00–$6.00	7.00– 8.00
Sunnyside	50	American Only				2.00			
Navajo	100	1.00	2.00	3.00	4.00	2.00	3.50	5.00	6.00

Points are $55.00. Going travel must commence on date of sale. Going transit limit is 15 days from date of sale and final return limit is October 31. Members are advised to consult with their agents for information concerning stop-overs, diverse routes, etc.

NEW MEMBERS.

Have you used that blank application form which has been sent you? Many already have as the Secretary is receiving daily new applications. **Don't forget that under the new ruling of the Constitution any person interested in public health work is now eligible to membership provided he has the proper endorsements.** Our Association should be the largest as well as the most important organization of its kind in the four countries. In order that this may be possible we must have the co-operation of our members. It should be relatively easy to interest some person in the Association. Won't you make a special effort to induce some eligible friend or acquaintance to join?

IN CONCLUSION.

Some few weeks ago the Secretary sent to each member a post card on which was requested that they indicate whether or not they were planning to be present at the Colorado Springs meetings. The response has been very satisfactory so far and it is assured that the Colorado Springs meetings will be well attended. A considerable number of members have so far failed to return their cards and they are requested to do so without delay. It can be readily understood that it is very important that the Local Committee be notified of the approximate number of members who are planning to be present, so that they may make their necessary arrangements. After you have read this Preliminary Announcement we feel sure that you will be anxious to come to Colorado if it is at all possible. Even if you have notified the Secretary to the effect that you are not planning to be present can't you reconsider and write to the Secretary stating that you will come ?

MINUTES OF THE FORTIETH ANNUAL MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION.

Washington, D. C., September 18–20, 1912.

First Session.

The fortieth annual meeting of the Association was called to order in the New Willard Hotel, Washington, D. C., September 18, 1912. The President, Doctor J. N. Hurty in the Chair and 350 members present.

The minutes of the preceding meeting having been published in the Journal of the Association, reading was, by unanimous consent, dispensed with.

The report of the Committee on Membership, duly approved by the Executive Committee, was then presented recommending certain individuals for membership in the Association. It was moved that the Secretary cast the ballot of the Association for the applicants recommended. Carried unanimously.

The Secretary then cast the ballot in accordance with the instructions of the Association. (Complete list of all members elected will be found on page 820).

The Secretary announced the following resignations had been received during the past year:

Dr. George McIntyre, Dr. George C. Wellner, Mr. Charles L. Parmalee, Rev. J. T. Martin, Dr. Laban Dennis, Dr. Albert M. Mueller, Mr. Edwin N. Ezekiel, Dr. John E. Meany, Dr. W. S. Disbrow, Dr. H. T. Marshall, Dr. Thomas Dawson, Mr. Boyden Nims, Dr. John M. Armstrong, Dr. George O. Murray, Dr. John W. Ross, Mr. Wm. E. Taylor, Dr. J. G. Rutherford, Lieut. Col. Dudley A. Mills, Dr. H. M. Bracken and Dr. C. H. Hughes.

Moved and seconded that these resignations be accepted. Carried.

The Secretary also reported the following deaths since the last meeting:

Mr. David S. Merritt, Dr. Q. O. Sutherland, Dr. S. E. Chaille, Dr. James A. Burroughs, Dr. J. C. Cameron, Dr. A. N. Bell and Dr. C. J. Burke.

On motion the meeting then adjourned.

Selskar M. Gunn,
Secretary.

J. N. Hurty,
President.

Second Session.

The meeting was called to order at 2.15 p.m., September 18, by the President.

Papers were then read as follows:

Health Work Progress in America, by Dr. Francis E. Fronczak, Health Commissioner, Buffalo, N. Y.

What State Control Over Streams Has Done in Pennsylvania in Seven Years, by Dr. Samuel Dixon, Commissioner, Department of Health of Pennsylvania, Harrisburg, Pa.

The Money Value of Human Life by Dr. C. V. Chapin, Superintendent of Health, Providence, R. I.

Method in Educational Hygiene, by Dr. Oscar Dowling, President, State Board of Health of Louisiana, New Orleans, La.

The Need for General Health Protective Surveys and Programs, by Mr. M. N. Baker, Editor Engineering News, New York, N. Y.

The Prolongation of Human Life, by Dr. Guy S. Kiefer, Health Officer, Detroit, Mich.

The Trend of Medico-Social Effort in Child Welfare Work, by Mr. Wilbur C. Phillips, New York, N. Y.

The National Health Insurance Act of England as a Factor in the Health Conservation Movement, by Dr. W. F. Snow, Secretary, State Board of Health, Sacramento, Cal.

Doctor William C. Woodward moved that in view of the fact that the Association of Agricultural Chemists was meeting in Washington, an Association which has to do largely with food and protecting it against adulteration, that the Secretary be instructed to invite the Association of Agricultural Chemists to attend the meetings of the American Public Health Association and to participate in the discussions. Motion was seconded and carried.

The meeting then adjourned.

Selskar M. Gunn, J. N. Hurty,
Secretary. *President.*

Third Session.

The meeting was called to order at 8 o'clock, September 18, the president in the Chair.

The invocation was pronounced by Rev. James Shera Montgomery. The address of welcome was delivered by Doctor Harvey W. Wiley of Washington. The responses were made as follows:

For the United States, Doctor Henry D. Holton.

For the Dominion of Canada, Doctor Peter H. Bryce.

For the Republic of Mexico, Doctor Eduardo Liceaga.

For the Republic of Cuba, Doctor Federico Torralbas.

The President of the Association then delivered his annual address. The meeting then adjourned.

Selskar M. Gunn, J. N. Hurty,
Secretary. *President.*

Fourth Session.

The meeting was called to order at 9 a.m., September 19, the President in the Chair.

On behalf of the Executive Committee the Secretary then submitted the

Report of the Treasurer duly audited and approved by the Committee of Seven as follows:

REPORT OF THE TREASURER AMERICAN PUBLIC HEALTH ASSOCIATION SEPTEMBER 1, 1912.

RECEIPTS.

F. W. Wright, Former Treasurer	$1653.15
B. R. Rickards, Former Editor	274.96
Interest on checking account (Lincoln Trust Co.)	6.67
Henry D. Holton: Donation	500.00
Robert M. Simpson: Donation	500.00
Fund raised by Chairman of Committee on Journal	1500.00
Office Receipts, March 1 to September 1, 1912	
Dues to Association	486.00
Subscriptions to Journal	1086.50
Sales of Journal	66.89
Advertisements	1007.08
Sales of Water Analysis Report	508.00
Sales of Transactions	139.00
Miscellaneous Receipts, Refunds, etc	149.97
Refunds on Postage % for mailing magazines	70.94
	$7949.16

DISBURSEMENTS.

For Journal:			
Salaries	$2169.50		
Salaries: 1911 account	79.65		
Printing	2294.05		
Printing: 1911 account	487.69		
Stationery	255.33		
Postage: General	339.36		
Postage and envelopes for mailing magazines	271.04		
Rent and Misc. office expenses	465.51		
Furniture	93.25		
Traveling expenses	76.25		
		$6531.63	
For Association:			
Printing	$102.65		
Stationery	207.33		
Postage	88.74		
Incidentals	98.44		
Traveling Expenses: 1911 account	293.00		
Transactions	34.32		
Water Analysis Reports	66.05		
		890.53	
Miscellaneous:			
Refunds, and disbursements for which reimbursements were made		154.53	
			7576.69
Balance on hand			$372.47

Special Account

On Deposit in		
Connecticut Savings Bank, New Haven	$1689.87	
National Savings Bank, New Haven	1148.56	
		2838.43
Total balance on hand		$3210.90

Livingston Farrand,
Treasurer.

September 17, 1912, audited and approved
J. N. Hurty,
Chairman of the Committee of Seven.

It was moved and seconded that the Treasurer's Report be accepted and placed on file. Carried.

The Executive Committee submitted the Report of the Committee of Seven as follows:

REPORT OF THE COMMITTEE OF SEVEN AMERICAN PUBLIC HEALTH ASSOCIATION.

In compliance with Article 5, Section 4 of the Constitution the Committee of Seven respectfully submits the following report of motions passed since the Havana meeting.

"That Selskar M. Gunn be elected Secretary."

"That the resignation of Dr. Wright be accepted and that Dr. Livingston Farrand be elected Treasurer of the Association."

"That the Committee of Seven instruct the Treasurer to transfer to Dr. Henry D. Holton, the Chairman of the Committee on Trust Funds in July as soon as the interest on the funds is paid, the trust funds then held to the credit of the Association in the Connecticut Savings Bank and the National Savings Bank of New Haven."

"That the Committee on Journal is hereby authorized to draw upon the trust funds of the Association for such sums as may be necessary to successfully conduct the publication of the Journal of the Association, and the Treasurer is hereby authorized to acknowledge all drafts or demands upon the trust funds made by the Committee on Journal upon endorsement by the President and Secretary of the Committee of Seven."

"That the Treasurer, Dr. Livingston Farrand, be authorized to open a banking account in the name of the Association, to sign and endorse checks, and to transact all business in connection with such account."

"That the new Treasurer of the Association, Dr. Livingston Farrand, be instructed to take out a bond for $5,000.00 at once and if possible to continue the former Treasurer's bond, so that there may be no lapse of time when the Treasurer is without a bond."

"That Dr. J. H. Townsend of New Haven be appointed auditor of the accounts of the retiring treasurer, Dr. Frank W. Wright."

"That the annual meeting of the American Public Health Association be held on the three days commencing Wednesday, September 18 and ending Friday, September 20, 1912."

"That the bill of $100 of Dr. Wright for services rendered the Association as Treasurer be approved."

"That the Committee of Seven appoint the following gentlemen to act as a Committee to arrange for the proper representation of the American Public Health Association at the International Congress of Hygiene and Demography; to see what the Association can do and what the probable cost would be:

Dr. H. D. Pease of New York, Dr. H. W. Hill of Minneapolis, Dr. W. C. Woodward of Washington, Dr. W. F. Snow of California, Dr. G. T. Swarts of Providence."

The Committee also begs to state that since the Havana meeting one hundred new members of the Association have been elected as provided in Chapter 5 of the By-Laws as amended December 6, 1913.

J. N. Hurty,
Chairman.

It was moved that the Report of the Committee of Seven be received and placed on file. Seconded and carried.

The Executive Committee submitted the Report of the Committee on Journal as follows:

REPORT OF THE COMMITTEE ON JOURNAL.

To the Members of the Executive Committee,

Gentlemen:

In compliance with instructions contained in the reports on Journal adopted by the Executive Committee, and approved by the Association at Havana, your committee last December at once took steps to get in touch with some publishing concern and if possible to get it to take up the publication of the Journal of the Association. After several informal conferences by members of your Committee with Dr. Livingston Farrand, of the Journal of "Out Door Life," a meeting was held in New York on January 2, 1912, at which the proposition of Dr. Farrand contained in the attached memorandum was discussed and afterwards unanimously adopted by the Members of the Journal Committee either present or present by proxy. The Committee on Journal communicated the proposition and its resolution adopting the same to the Members of the Committee of Seven, and secured their approval of its action.

As was to be expected, some time was necessary to have completed the large amount of work belonging to the offices of the Secretary and Treasurer arising out of the Havana meeting and while Dr. Farrand as Editor-in-Chief, at once proceeded with the publication of the January number of the Journal, it was not till March 15, when the second meeting of the Journal Committee was held, that the organization of the editorial work of the Journal Committee was completed and Dr. Farrand became treasurer of the Association and Editor-in-Chief of the American Journal of Public Health with Prof. S. M. Gunn, Managing Editor and Dr. P. P. Jacobs, Business Manager.

The organization of an Editorial Staff with the offices of the Association in New York, having been affected the Committee has found it unnecessary to hold further meetings, different members finding it possible to be in New York from time to time, when they have found the work becoming each month better organized and a progressive business concern, whose exact status up to date is to be found in the statement of the Editor-in-Chief and Treasurer submitted herewith.

In view of the annual meetings having been in December 1911, and in September 1912, and owing to the fact that the organization of the editorial staff was not completed till March 15, 1912, only six months have been afforded your Journal Committee wherein to obtain results from the efforts made to establish a journal worthy of the Association. As the report of the Committee on Journal, adopted by the Association at Milwaukee, September, 1912, is the basis upon which the work of your Committee of this year has been carried on it has assumed that the period for which its arrangements with the Editor-in-Chief, and his staff were made, is for a year, rather than for the time between one annual meeting and another. Your Committee has therefore made the payment of salaries by months on the basis of the agreement adopted at the meeting in January last. This arrangement is being continued as all the Journal staff have consented to continue in their positions for this year. Your Committee on Journal would however, recommend that the calendar year be the period for which it is authorized to make its arrangements with the Editor-in-Chief, and his staff.

Your Committee in completing this its first report, rather than complimenting itself, prefers to have the work of the editorial staff measured by their success even in six months, in establishing a Journal intended to express, and as a matter of fact illustrating the best ideals of scientific journalism, an organ, the exponent of the best public health work and practice and a publication worthy of the confidence and support of the sanitarian of the four countries represented in the American Public Health Association. Your Committee desires further to express the hope that the work of a committee, which has been marked by singular unanimity of opinion as to what the situation in the interest of the Association demanded and by the greatest harmony in coöperating with its staff to that end, be continued so that, as it firmly believes, the continuity of work and effort on its part and that of its editorial staff will by the end of another year find the Association the possessor of a self-sustaining Journal of the highest scientific and literary character.

The Committee on Journal,
(Signed) P. H. BRYCE,
Secretary.

HENRY D. HOLTON, *President.*
Washington, D. C.,
September 17, 1912.

It was moved that the report be accepted and that a vote of thanks be given to the Journal Committee for their very efficient work during the past year and further that the recommendations made in the report be adopted. Seconded and carried.

New members were elected.

Doctor G. Lloyd Magruder presented a resolution relating to definite standards and regulations for dairy products. On motion the resolution was referred to the Executive Committee. Doctor G. Lloyd Magruder then offered a second resolution relating to standard methods of dairy farm inspection which was also referred to the Executive Committee.

Papers were then read as follows:

SYMPOSIUM ON COLD STORAGE

Cold Storage and Public Health, by Professor William T. Sedgwick, Massachusetts Institute of Technology, Boston, Mass.

The Physics of Refrigeration as Applied to the Conservation of Food Products, by Dr. Peter H. Bryce, Superintendent of Immigration, Ottawa, Canada.

The Bacteriology of Fermentation and Putrefaction in Relation to the Conservation of Foods, by Professor Samuel C. Prescott, Massachusetts Institute of Technology, Boston, Mass.

The Hygienic and Economic Results of Refrigeration in the Conservation of Poultry and Eggs, by Dr. Mary E. Pennington, Chief of Food Research Laboratory, Bureau of Chemistry, U. S. Department of Agriculture, Philadelphia, Pa.

The Hygienic Results of Refrigeration in the Conservation of Fish and Mollusks, by Dr. Herbert D. Pease, Lederle Laboratories, New York City.

Cold Storage in Relation to the Food Supply, by Mr. Harry E. Barnard, State Food and Drug Commissioner, Indianapolis, Ind.

The Committee on Cold Storage then presented its report.

It was moved that the Report be referred to the Executive Committee. Motion seconded and carried.

The following papers were then read:

Methods used in Eradicating Hookworm Disease, by Dr. John A. Ferrell, Director Hookworm Commission, Raleigh, N. C.

Sewage Treatment versus Sewage Purification, by Professor George C. Whipple, Harvard University, Cambridge, Mass.

Seasonal Temperatures and Seasonal Diseases, by Dr. Charles E. North, Consulting Sanitarian, New York, N. Y.

Possible Dangers in Mineral Waters, by Dr. Julio F. Arteaga, Havana, Cuba.

Rules of Hygiene which should be observed in Hospitals and in Sanatoria, by Dr. Miguel Marquez, Chihuahua, Mexico. (Read by Title.)

The meeting then adjourned.

SELSKAR M. GUNN,
Secretary.

J. N. HURTY,
President.

Fifth Session.

The meeting was called to order at 8 p. m., September 19, the President in the Chair.

The Report of the Committee on the Control of Milk Supplies was presented. It was moved that the Report be referred to the Executive Committee. Seconded and carried.

The Committee on the Conservation of Infant Life made its report. It was moved that the Report be referred to the Executive Committee. Seconded and carried.

The following papers were then presented:

Some Newer Problems in the Anti-Tuberculosis Warfare in the United States, by Dr. S. Adolphus Knopf, New York, N. Y.

Educational Publicity in Offense and Defense, by Dr. Hoyt E. Dearholt, Executive Secretary, Wisconsin Anti-Tuberculosis Association.

The Prophylaxis of Bubonic Plague, by Dr. W. C. Rucker, Assistant Surgeon General, United States Public Health Service, Washington, D. C.

The Defense of the Mexican Republic Against the Possible Invasion of Bubonic Plague, by Dr. Eduardo Liceaga, President, Superior Board of Health, Mexico.

The Application of Vaccines in the Prevention of Plague, by Dr. W. H. Frost, Passed Assistant Surgeon, U. S. Public Health Service, Washington, D. C.

The Importance of Factors other than Feeding in the Control of Infantile Diarrhœa, by Dr. E. C. Levy, Chief Health Officer, Richmond, Va.

A Unique Organization of Milk Dealers, by Mr. F. D. Bell, Lederle Laboratories, New York, N. Y.

An Outbreak of Septic Sore Throat, by Dr. William Royal Stokes and Dr. F. W. Hachtel, Bureau of Bacteriology, State Department of Health, of Maryland, Baltimore, Md.

Institutional Vaccination, by Dr. J. N. Force, Assistant Professor of Epidemiology, University of California, Berkeley, Cal. (Read by title.)

The meeting then adjourned.

SELSKAR M. GUNN,
Secretary.

J. N. HURTY,
President.

Closing Session.

The meeting was called to order at 8 p. m., September 20, the President in the Chair.

The first thing on the program was the election of new members.

REPORT OF THE EXECUTIVE COMMITTEE.

In accordance with the notice of change in the Constitution made at Havana in 1911 by Dr. Bryce with the view to abolishing associate membership and making any person interested eligible to membership in the general association without any specified technical training, the Executive Committee recommends that the Constitution be so altered by the Committee of Seven in its reading so that the wording be made to conform thereto.

The Executive Committee recommends the adoption of the following resolution:

"Resolved, that the committees authorized at the last preceding meeting of the Association and not specifically discharged at this meeting be continued, and that the President be authorized to appoint such other committees as to him may seem proper."

The Executive Committee reports that Drs. Holton, Swarts, Bryce and Pease had been elected by the Executive Committee to serve on the Committee of Seven during the ensuing year and that the Journal Committee composed of Drs. Holton, Swarts and Bryce be continued as already approved of by vote of the Association.

The Executive Committee reports the election of Prof. C.-E. A. Winslow and Mr. Burt R. Rickards to serve on the Membership Committee as provided for in the Constitution.

In accordance with the notice of change in the Constitution made in Havana in 1911 by Dr. Levy, the Executive Committee recommends the following amendment to Article 5, Section 8 of the Constitution:

Add to the first paragraph the following: "Members of the Advisory Council representing States, provinces, territories, or districts shall be selected by the active members of the Association of each State, province, territory or district present at each meeting, and their selection shall be reported in writing to the Secretary. In event of the failure of any such delegation so to report, the Executive Committee shall nominate the representatives of such jurisdiction on the Advisory Council or authorize the President to do so."

J. N. Hurty,
Chairman.

It was moved that the Report be approved and made part of the Proceedings. The motion was seconded and carried.

It was moved that the resolutions contained in the report be adopted. The motion was seconded and carried.

REPORT OF ADVISORY COUNCIL.

The Advisory Council met on September 19 at 4.30 p. m. in the New Willard Hotel, Washington, D. C., and was called to order by the Secretary of the Association. Upon roll call, representatives responded as follows:

United States.

Army, Medical Department, Col. J. R. Kean; Bureau of the Census, Dr. Cressy L. Wilbur; Alabama, Dr. W. H. Sanders; California, Dr. Wm. F. Snow; Colorado, Dr. O. R. Gillett; Connecticut, Dr. Joseph H. Townsend; Delaware, Dr. A. E. Frantz; Florida, Dr. Joseph Y. Porter; Georgia, Dr. V. H. Bassett; Iowa, Dr. Henry Albert; Massachusetts, Prof.

James O. Jordan; Michigan, Dr. R. L. Dixon; Minnesota, Dr. R. H. Mullin; Missouri, Dr. D. L. Harris; Montana, Dr. T. D. Tuttle; Nebraska, Dr. E. A. Carr; New Jersey, Dr. A. C. Hunt; New York, Dr. E. H. Porter; North Carolina, Dr. W. S. Rankin; North Dakota, Dr. G. A. Ruediger; Ohio, Dr. C. A. Ford; Pennsylvania, Dr. W. R. Batt; Rhode Island, Dr. G. T. Swarts; Virginia, Dr. E. C. Levy; Washington, Dr. J. E. Crichton; Wisconsin, Prof. M. D. Ravenel; District of Columbia, Dr. W. C. Woodward; Canal Zone, Dr. A. J. Orenstein.

CANADA.

Immigration Service, Dr. P. H. Bryce; Alberta, Dr. T. H. Whitelaw; Manitoba, Dr. R. M. Simpson; Saskatchewan, Dr. W. J. McKay; Ontario, Dr. John A. Amyot.

MEXICO.

Superior Board of Health, Dr. E. Liceaga; Guanajuato, Dr. F. Valluenza; San Luis Potosi, Dr. J. E. Monjaras.

SECTIONS.

Laboratory, Dr. J. F. Anderson; Vital Statistics, Dr. W. H. Guilfoy; Municipal Health Officer, Dr. G. F. Goler; Sociological, Dr. L. Farrand; Sanitary Engineering, Dr. H. D. Pease.

The Council then organized by the election of Dr. J. H. Townsend, of Connecticut, as Chairman, and Dr. H. D. Pease, of New York, as Secretary.

Upon ballot, the Council nominated the members named below, each for the office stated immediately preceding his name:

For President, Rudolph Hering, D. Sc., of New York.

For First Vice-President, Dr. W. R. Batt, of Harrisburg, Pa.

For Second Vice-President, Dr. James Roberts, of Hamilton, Ont.

For Third Vice-President, Dr. J. E. Monjaras, of San Luis Potosi.

For Secretary, to fill the unexpired term of Dr. Woodward, which has been filled by Selskar M. Gunn by vote of the Committee of Seven since Dr. Woodward's resignation, Selskar M. Gunn.

For Treasurer, for two years, Dr. Livingston Farrand.

For Executive Committee, each to serve two years, Dr. J. Y. Porter, Dr. J. F. Anderson, Dr. W. G. McKay.

Invitations to meet in 1913 in each of the places named below were received:

Philadelphia, Atlantic City, St. Louis, Niagara Falls, New Orleans, Jacksonville, Colorado Springs, Canal Zone, Indianapolis, San Francisco, Kansas City, Chicago.

Upon ballot, the Council voted to recommend that the invitation of Colorado Springs be accepted.

The Council by ballot nominated the person named below for election as honorary member:

Dr. Jacques Bertillon, of Paris.

There being no further business, the Council then adjourned.

J. H. TOWNSEND,
Chairman.
H. D. PEASE,
Secretary.

It was moved that the Secretary be instructed to cast one ballot for all the names recommended in the Report. The motion was seconded and carried and the Secretary cast the ballot and declared the gentlemen elected.

It was moved that the recommendation of the Advisory Council with regard to the 1913 place of meeting be accepted and that Colorado Springs be selected. The motion was seconded and carried.

The following papers were then presented:

The Importance of Negative Eugenics or the Prevention of Ill-bornness, by Dr. Woods Hutchinson, New York, N. Y.

Common Sense in Public Health Work, by Prof. William T. Sedgwick, Massachusetts Institute of Technology, Boston, Mass.

Economic Aspects of Hygiene in Factory Management, by Dr. Winthrop Talbot, Editor, Human Engineering, Cleveland, Ohio.

Mosquito Catching in Dwellings as an Anti-Malaria Measure, by Dr. A. J. Orenstein, Assistant Chief Sanitary Inspector, Isthmian Canal Commission, Ancon, C. Z.

Prevention of Insanity, by Mr. Homer Folks, Secretary, State Charities Aid Association, New York, N. Y.

Annual Report on Yellow Fever in the Republic of Mexico, by Dr. Eduardo Liceaga, President, Superior Board of Health, Mexico.

Typhoid Fever Prevention, by Dr. L. L. Lumsden, Past Assistant Surgeon, U. S. Public Health Service, Washington, D. C.

Rural Typhoid in Manitoba, by Dr. R. M. Simpson, Chairman Board of Health, Winnipeg, Canada.

The Yakima Sanitary Campaign, by Dr. Thomas Tetreau, Health Officer, North Yakima, Wash.

A Plea for a More Widespread Interest in the Investigation and Control of Typhoid Fever, by Dr. William C. Hanson, Assistant to the Secretary, State Board of Health of Massachusetts, Boston, Mass.

Typhoid Fever as Related to Rural Public Health Administration, by Dr. Charles F. Bolduan, Assistant to the General Medical Officer, Department of Health, New York, N. Y

The following reports were received and ordered placed on file.

REPORT OF THE LABORATORY SECTION.

The Laboratory Section begs to announce the election of officers as follows:

Chairman, Professor F. P. Gorham,
Vice-Chairman, Professor Edward Bartow,
Recorder, Dr. A. W. Freeman,
Secretary, Dr. D. L. Harris.

Elected members of Council:

Dr. A. P. Hitchens, Dr. J. A. Amyot, Professor C. E. A. Winslow, Mr. C. P. Moat.

REPORT OF THE SECTION ON VITAL STATISTICS.

The Section on Vital Statistics begs to announce the election of officers as follows:

Chairman, Dr. W. S. Rankin,
Vice-Chairman, Dr. J. E. Monjaras,
Secretary, Mr. David S. South.

REPORT OF THE MUNICIPAL HEALTH OFFICERS SECTION.

The Section of Municipal Health Officers has elected the following officers for the ensuing year:

Chairman, Dr. P. M. Hall, Minneapolis,
Vice-Chairman, Dr. John H. Landis, Cincinnati,

Secretary, Dr. E. C. Levy, Richmond,

Recorder (held over from this year), Dr. A. S. Fell, Trenton.

Advisory Members of Section Council:

Dr. J. S. Neff, Philadelphia, Dr. James Roberts, Hamilton, Ont., Dr. Jesus Monjaras, Mexico City, Dr. A. G. Dominguez, Havana, Dr. C. E. Terry, Jacksonville.

Section Member of Advisory Council:

Dr. G. W. Goler, Rochester.

The Municipal Health Officers Section has, in accordance with the requirements of the Constitution of said Section, amended Sections 1 and 8 of its Constitution, to read as follows:

1. This organization shall be known as the American Public Health Association—Section of Public Health Officials.

8. There shall be but one class of membership, the active. National, State, Provincial, County, City, township and village health officials, or employees, who are members of the A. P. H. A. and who have been, or are, in active public health work, are alone eligible. The Section asks the approval of the Association as required by the Constitution.

The following resolution was proposed by Dr. Wm. C. Woodward and referred to the Section Council:

"Whereas the interests of the Municipal Health Officers' Section of the American Public Health Association and those of the Conference of State and Provincial Boards of Health are essentially identical;

"And whereas the members of the State and Provincial Boards of Health, to a large extent, attend the meetings of both organizations;

"And whereas the time and expense incident to attending annually two meetings, held at different dates and places is considerable;

"Therefore, Be it resolved that the Municipal Health Officers' Section of the American Public Health Association requests the Association to extend an invitation to the Conference of State and Provincial Boards of Health to affiliate with said Section."

The above was recommended by the Section Council, passed unanimously by the Section and forwarded to the Association for action.

The communication from Dr. F. Park Lewis, Chairman of the Committee on Prevention of Blindness of the American Medical Association, which was referred to the Municipal Health Officers' Section by the Executive Committee, was referred to a special committee of three, Drs. Landis, Guyon, and Crichton, with instructions to report at the 1913 sessions.

The following resolution, made by Dr. Magruder, which was referred to the Municipal Health Officers' Section by the Executive Committee, was unanimously adopted by the Section:

"Whereas, it has been shown that valuable results have been obtained from the requirement for proper inspection of dairy farms and dairy depots before granting a permit for the production and distribution of milk and that the score card has been of great utility in recording the observations made at such inspections;

"Be it resolved that efforts be made to secure uniform standards for inspection and methods of recording the same."

E. C. Levy, *Secretary*,
M. H. O. Section.

It was moved that the various recommendations made in this report be adopted. Seconded and carried.

REPORT OF THE SANITARY ENGINEERING SECTION.

The Sanitary Engineering Section begs to announce the election of officers as follows:

Chairman, Col. J. L. Ludlow,

Vice-Chairman, Mr. R. S. Weston,

Secretary, Dr. H. D. Pease,
Recorder, Prof. G. C. Whipple.

Elected members of Council:

Mr. Rudolph Hering, Professor C. E. A. Winslow, Mr. Harrison P. Eddy, Mr. Morris Knowles, Mr. F. Herbert Snow.

REPORT OF THE SOCIOLOGICAL SECTION.

The Sociological Section begs to announce the election of officers as follows:

Chairman, Mr. Homer Folks,
Vice-Chairman, Dr. H. E. Dearholt,
Secretary, Mr. S. Poulterer Morris.

The following resolution was offered by Dr. Bryce, seconded and unanimously carried:

Resolved, that the thanks of the American Public Health Association be extended to the members of the Local Committee of Arangements for the conveniences and courtesies extended to the members; to the local press for their good reports of the papers and discussions and to the citizens and members of the medical profession for kindnesses extended to members and visiting delegates.

Moved by Doctor Lumsden that a rising vote of thanks be extended to our distinguished President and our very able and efficient Secretary for the excellent administration they have given the Association during this most notable session. The motion was put by Dr. Lumsden and seconded by Professor Sedgwick and unanimously carried, whereupon the Association adjourned.

J. N. Hurty,
President.

Selskar M. Gunn,
Secretary.

NEW MEMBERS

Names of persons elected at the Washington meeting of the Association or in the interim from the Havana meeting by action of the Committee of Seven:

Anderson, John B., M.D	Spokane, Wash.
Andrews, Charles James, M.D	Norfolk, Va.
Ashford, Bailey Kelly (Major) M.D	San Juan, Porto Rico
Ayres, S. H.	Washington, D. C.

Baker, Moses Nelson	Upper Montclair, N. J.
Baldwin, Frank Oscar	Richmond, Va.
Ball, Halsey Jay, M.D	Cortland, N. Y.
Ball, Henry Bryant	Newark, N. J.
Barnard, Harry Everett	Indianapolis, Ind.
Bassett, Victor H., M.D	Savannah, Ga.
Billings, Frederick Horatio	Lawrence, Kans.
Bishop, Robert H., Jr., M.D	Cleveland, Ohio
Blue, Rupert, M.D	Washington, D. C.
Bolduan, Charles Frederick, M.D	New York City

Booker, Warren H	Raleigh, N. C.
Boyd, James Van Wagner, M.D	Springfield, Mass.
Bramley, Harry Eugene	New York City
Braymer, Arthur A	Seattle, Wash.
Brooks, James Emery	Glen Ridge, N. J.
Brosius, Albert M	Havana, Cuba
Brown, Claude P., M.D	Philadelphia, Pa.
Brown, Peyton R., M.D	West Point, Miss.
Bull, Irving C	New York City
Burritt, Bailey B	New York City
Buttles, Ernest Hiram, M.D	Burlington, Vt.
Carpenter, Wm. Taggart	Brooklyn, N. Y.
Cauchon, Noulan, C. E	Ottawa, Canada
Chagnon, Charles E., M.D	Arctic, R. I.
Chapin, R. C	Beloit, Mich.
Chapman, Frank Tomes	New York City
Clark, Frederick E., M.D	Burlington, Vt.
Clark, J. A., M.D	Havana, Cuba
Clinton, George, M.D	Belleville, Ontario
Coulter, Lester M., M.D	Toronto, Ontario
Coward, Francis Asbury, M.D	Columbia, S. C.
Crichton, James Edward, M.D	Seattle, Wash.
Crull, Eric A., M.D	Ft. Wayne, Ind.
Crumbine, Samuel J., M.D	Topeka, Kans.
Dalton, Charles Francis, M. D	Burlington, Vt.
Datesman, George Elvin	Philadelphia, Pa.
Deacon, William J. V	Topeka, Kans.
Deforest, Robert Weeks	New York City
DeGarmo (Mrs.), E. D	Portland, Me.
De Pree, Con	Holland, Mich.
Dixon, Robert Livingston, M.D	Lansing, Mich.
Dodd, Walter Le Roy	Detroit, Mich.
Doolittle, Roscoe Edward	Washington, D. C.
Dowd, Wyllys E., Jr	New York City
Dublin, Louis I., M.D	New York City
Edwards, John, M.D	Gloversville, N. Y.
Fahey, Edward W., M.D	Duluth, Minn.
Fitzgerald, John Gerald, Prof	Berkeley, Cal.
Fulton, John S., Jr	Baltimore, Md.
Furbush, C. Lincoln, M.D	Philadelphia, Pa.
Furstman, Jacob Milton, M.D	LaCrosse, Wis.
Gallivan, William Joseph, M.D	South Boston, Mass.
Gaub, John	Washington, D. C.
Gay, Frederick Parker, Prof	Berkeley, Cal.
George, W. E., M.D	North Bay, Ontario
Gillett, Omer Rand, M.D	Colorado Springs, Colo.

Goltman, Maxamillian, M.D	Memphis, Tenn.
Goodell, John Milton	Upper Montclair, N. J.
Graham-Rogers, Charles T., M.D	New York City
Greeley, Samuel Arnold	Winnetka, Ill.
Green, Frank Whitney	Passaic, N. J.
Gregory, John H	New York City
Griffitts, Thos. H. D., M.D	Springfield, Ill.
Gulick, Luther Halsey, M.D	New York City

Hallenbeck, Orlando J., M.D	Canandaigua, N. Y.
Hard, William	New York City
Harrison, Shelby M	New York City
Harrison, Wm. S., M.D	Toronto, Canada
Harvey, P. W	Cleveland, Ohio
Herms, William Brodbeck	Berkeley, Cal.
Hibbard, Mary Eugenie (Miss)	Havana, Cuba
Hoffman, James David	Lincoln, Neb.
Howard, John R., Jr	East Northfield, Mass.
Howard, Norman Joseph	Toronto, Ontario
Howe, William Augustus, M. D	Phelps, N. Y.
Hudson, Jessie Blanche, M.D	Iowa City, Iowa
Humphrey, Henry C	New York City
Huntoon, Gardner A., M.D	Des Moines, Iowa
Hutchinson, Woods, M.D	New York City

Ihlder, John	New York City

Jacobs, Philip Peter, Ph.D	New York City
Jenkins, James, Jr	Brooklyn, N. Y.
Jones, Henry Neely	Brookline, Mass.

Kastenhuber, Edwin Gustav, Jr	Vineland, N. J.
Keith, Simeon Curtis, Jr	Brookline, Mass.
Kelley, Eugene Robert, M.D	Seattle, Wash.
Kelley, Florence (Mrs.)	New York City
Kendrick, Arthur	Cambridge, Mass.
Kennedy, George Grant	Harrisburg, Pa.
Kilbourne, Chas. Herbert	New York City
Kimball, Dwight Deland	New York City
King, William F., M.D	Indianapolis, Ind.
Kingsley, Sherman C	Chicago, Ill.
Kligler, Israel Jacob	Bronx, N. Y.
Kneeland, George J	New York City

Ladd, Edwin F	Fargo, N. D.
Lafreniere, Theodore Joseph	Montreal, Canada
Laidlaw, W. C., M.D	Edmonton, Alberta, Canada
Lappin, Richard Corcoran	Washington, D. C.
Larson, Alfred	Bismarck, N. D.
Lattimore, Alida	Rochester, N. Y.
Le Prince, Joseph Augustin, M.D	Ancon, Canal Zone

Leslie, James Franklin, M.D	Waterville, Wash.
Lord, (Mrs.) Frederick T	Boston, Mass.
McClenahan, Daniel A.	Hamilton, Ontario, Canada
McCullough, John Wm. Scott, M.D	Toronto, Ontario, Canada
McGlenen, Edward Webster	Boston, Mass.
McLaughlin, Allan J., M.D	Washington, D. C.
McLean, Francis H	New York City
McNally, Thomas J., M.D	Toronto, Ontario, Canada
MacFarland, Charles Steadman, Rev	New York City
Magruder, George Lloyd, M.D	Washington, D. C.
Mahoney, Francis Xavier, M.D	Boston, Mass.
Mahoney, John Joseph, M.D	Jamestown, N. Y.
Mark, Edgar N	Bowling Green, Ky.
Massey, Mabel	Raleigh, N. C.
Meader, Fred Marlin	Syracuse, N. Y.
Mebus, Charles Fillmore	Philadelphia, Pa.
Menge, George Albert	Washington, D. C.
Menninger, Charles Fredric, M.D	Topeka, Kans.
Miles, Rufus E	Cincinnati, Ohio
Mohler, Bruce Monroe	Minneapolis, Minn.
Moloney, Paul J., M.D	Cornwall, Ontario
Moriarta, Douglas Calhoun	Saratoga Springs, N. Y.
Morris, S. Poulterer	Denver, Colo.
Nasmitt, George Gallie	Toronto, Ontario
National Board of Y. M. C. A. of U. S	New York City
Neill, Mather Humphrey, M.D	Pittsfield, Mass.
Nelbach, George Joseph	New York City
Nickerson, Joseph F	Chicago, Ill.
Nutting, Louis Blackstone	New York City
Norton, John Foote	Boston, Mass.
Ogden, Henry Neely	Ithaca, N. Y.
Orenstein, Alexander J., M.D	Ancon, Canal Zone
Overton, Frank, M.D	Patchogue, L. I.
Park, William E., M.D	Rockford, Ill.
Paxton, James Wilson	Washington, D. C.
Pennington, Mary Engle, M.D	Philadelphia, Pa.
Phillips, Albert William, M.D	Derby, Conn.
Phillips, Asa Emery	Washington, D. C.
Phillips, Wilbur C	Pomona, N. Y.
Pons, Louis J., M.D	Roxbury, Conn.
Porter, F. B	Fort Worth, Tex.
Prentiss, (Mrs.) S. R	Bangor, Me.
Prest, Charles Samuel, M.D	Waterford, N. Y.
Quinn, Murtha P	Philadelphia, Pa.
Race, Joseph	Toronto, Canada
Reinhardt, George Frederick	Berkeley, Cal.

Rex, Clarence R	Toledo, Ohio
Ritchie, John, Jr	Boston, Mass.
Roach, Walter William, A.M., M.D	Philadelphia, Pa.
Romer, John Boyd	Chicago, Ill.
Routzahn, Evart Grant	New York City
Rush, Chas. Henderson, M.D	Lincoln, Neb.

Sanders, Wm. Henry, M.D	Montgomery, Ala.
Sandman, Edgar August	Relay, Md.
Schaefer, Arthur Charles, M.D	Buffalo, N. Y.
Schroeder, May Catherine, M.D	New York City
Scudder, Kate	Covington, Ky.
Seager, Henry Rogers	New York City
Shimer, Will, M.D	Indianapolis, Ind.
Shirreff, William Taylor, M.D	Ottawa, Ontario
Smith, Karl W., M.D	Madison, Wis.
Smyth, Francis Robertson, M.D	Bismarck, N. D.
Snow, Frank Herbert	Harrisburgh, Pa.
Stevenson, William Lowrie	Philadelphia, Pa.
Storey, Thomas Andrew	New York City
Streeter, Lilian Carpenter (Mrs. Frank S.)	Concord, N. H.

Talbot, Winthrop, M.D	Cleveland, Ohio
Tetreau, Thomas, M.D	North Yakima, Wash.
Tilley, Frank William	Washington, D. C.
Tucker, George Eugene, M.D	Riverside, Cal.

Underwood, Arthur Whitman, M.D	St. Augustine, Fla.

Van Buren, George Henry	Washington, D. C.

Wagner, Adolph	Newport News, Va.
Wald, Lillian D	New York City
Walker, John T. Ainslie	New York City
Warren, Benj. S., M.D	Washington, D. C.
Webber, Steven E., M.D	Calais, Me.
Webster, George Smedley	Philadelphia, Pa.
Whinery, Samuel	New York City
White, Courtland Y., M.D	Philadelphia, Pa.
Whittier, Frank N., M.D	Brunswick, Me.
Wile, Ira Solomon, M.D	New York City
Wilson, Wm. W., M.D	Lincoln, Neb.
Wright, Adam Henry, M.D	Toronto, Canada

Young, Calvin Todd	Plant City, Fla.
Young, Clifford Caudy	Lawrence, Kans.

HONORARY MEMBER.

Bertillon, Jacques, M.D	Paris, France

BOOK REVIEWS

Causes of Death among Woman and Child Cotton-mill Operatives. *By Arthur Reed Perry, M.D., Government Printing Office, Washington, D. C., 1912.*

This report constitutes Vol. XIV of the larger report on the investigation recently made by the United States Bureau of Labor into the industrial, social, moral, educational and physical condition of woman and child workers in the United States. As the title indicates, this section of the general report is limited to an intensive study of the mortality of women and children employed in cotton-mills. Certain typical cities were selected for the investigation, namely, Fall River, Mass., Manchester, N. H., and Pawtucket, R. I., in the north, and, in the south, Augusta, Ga., Atlanta, Ga., and Raleigh, N. C. The data obtainable for the southern cities, however, proved to be so incomplete that the study was confined to the three New England cities. The mortality figures refer to the three years 1905, 1906 and 1907. The total number of deaths of female operatives in the three New England cities during the three-year period was 450, and comparison is made of this mortality with 3,074 deaths of female non-operatives, 423 deaths of male operatives, and 2,656 deaths of male non-operatives. The grand total of deaths considered in the investigation was, therefore, 6,603.

The conclusions reached by the author may be briefly summarized as follows:

(1) The effect of cotton-mill work upon health, as reflected in the death rate, differs widely between the sexes, the female death rate at ages 15–44 being 7.63 per 1,000 employed, against a rate of 5.74 for male operatives.

(2) Female cotton-mill operatives have a high general death rate from tuberculosis, the rate being more than twice that of female non-operatives. In some age groups the relative differences are even more unfavorable to the operatives.

(3) An examination of the different factors which might adversely affect the death rate, led the author to conclude that cotton-mill work is prejudicial to the health of females and "that the combination of operative work with matrimony is especially harmful, and that, while the general hazard of the female operative is greater than that of the non-operative, she is in more danger from tuberculosis."

(4) The investigation disclosed the fact that the official death records contained many and serious errors, particularly in reference to the occupations of the decedents, and to the causes of death. The author corrected the errors of the first class so far as that was possible, but all of the latter were accepted. He asserts that "the conclusions reached in the investigation, therefore, certainly understate the facts as to the death rates of female operatives, the mortality from tuberculosis, and the special hazard of married women."

The author of this report has apparently taken great pains to make his investigation in many particulars as thorough as the facts warrant. There are some features of the report, however, which do not appear to be above criticism. For illustration, the high mortality of the Irish is dilated upon as if this were a new discovery, but equally suggestive data were published in Part I, Vital Statistics, Twelfth Census, 1900. The method adopted of presenting the data for a three-year period and for a one-year period has not been conducive to clearness and apparently serves no useful purpose. It may also be objected that not enough emphasis has been placed upon the relative mortality among the different employments. In this particular the author might have improved his report by modeling it after the annual reports of the Medical Health Officer of Blackburn, England. Also, more emphasis might properly have been placed upon the sanitary conditions of the various classes of work rooms—card, spinning, spooler, slasher, weave, etc. Considerable attention is devoted to housing conditions but practically no information is presented to show the physical conditions within the cotton mills, such as dust, temperature, humidity, etc., which together must have operated more or less powerfully to undermine the health of the operatives, if the comparative death rates presented in the report are to be accepted as substantially correct.

Criticism is also justifiable of the method adopted of discussing the mortality only at ages 15 to 44 and 10 and over. No emphasis whatever is placed upon the mortality in the age group, 10 to 14, and as little upon the mortality at ages 45 and over. The report is supposed to deal with the woman and *child* workers in cotton-mills and the reader will naturally expect to find some qualified analysis of the data relating to operatives of ages under fifteen, but he will be disappointed.

On the whole, this report must be accepted as a valuable contribution to our knowledge of the mortality of cotton-mill operatives in this country, and as an important addition to the American bibliography of occupational diseases and mortality.

Frederick S. Crum.

Chloride of Lime in Sanitation. *By Albert H. Hooker, Technical Director, Hooker Electrochemical Company, 224 pp. cloth, $3.00. John Wiley & Sons, New York, Chapman & Hall, Limited. London, 1913.*

The first part of this book is a practical working manual for those who use chloride of lime or calcium hypochlorite for purposes of disinfection. It describes the manufacture, chemical analysis and general properties of the commercial product. Its use as a water disinfectant is described historically and with careful attention to the technical detail.

A similar treatment is given to the subject of sewage disinfection with special reference to the sanitary conditions in New York Harbor. Some reference is also made to the use of hypochlorite in street sprinkling and also in surgery and general sanitation.

An extensive bibliography comprises two-thirds of the volume. All the more important articles are also abstracted, some of them at considerable length. This portion of the book is a most valuable contribution to this whole subject and the work has apparently been done with painstaking care, and with excellent and most commendable judgment. Altogether some 442 citations are given either by title or in abstract.

Earle B. Phelps,

Mass. Institute of Technology.

The Orientation of Buildings or Planning for Sunlight. *By William Atkinson, Fellow of the Boston Society of Architects, First Edition, 8 vo. xiii 139 pages, 74 figures, cloth, $2.00 net. John Wiley & Sons, New York, Chapman & Hall, Limited. London, 1912.*

This volume is a valuable contribution to that newer aspect of architecture which recognizes that matters of the health and comfort of the people, such as heating, ventilation and illumination, constitute fundamental factors in architectural design. The author starts with the axiom that "one of the first requisites for a healthy building is abundance of sunlight." He develops the astronomical problem in such a way that the laymen can at least appreciate the applications which he makes later. Upon this basis he builds an ingenious method of developing shadow diagrams from which he can finally show that with any given type of structure and with any stated orientation, definite portions of the immediate surroundings and of the side walls of the building will be in sunlight or in shadow for stated periods of time.

These shadow diagrams are later extended to the problem of interior illumination through windows and to the effect upon such illumination of adjacent buildings. The latter half of the book is devoted to the practical application of these matters with especial reference to the design and orientation of hospitals, to the laying out of streets and to the effect of high buildings upon them. An appendix contains abstracts from city building codes.

Earle B. Phelps,

Mass. Institute of Technology.

School Janitors, Mothers and Health. *By Helen C. Putnam, A.B., M.D., of the Committee of the American Academy of Medicine on the Teaching of Hygiene. Easton, Pa.; American Academy of Medicine Press. pp. 201, cloth, $1.00 net, postage prepaid.*

This volume by Dr. Helen C. Putnam of Providence is made up in the main of three series of short articles which appeared month by month in the Child-Welfare Magazine between 1909 and 1912. The current of thought is therefore somewhat broken and there is occasional repetition. What is lost in this way is perhaps more than made up by the fact that the compact topical form, re-enforced by Dr. Putnam's breezy and effective style, makes the book an eminently readable one.

The first of the three principal sections chiefly deals with the maintenance of such home conditions as will promote the health of the child and enable it to pass successfully through the necessary strain of its school life. In connection with the opening of the fall term the author says "A mother can make no wiser plan for the coming nine months than to concentrate on preventing school fatigue in her own children; after them, in the children of the less fortunate, whose ill health reacts on her own." The air conditioning of the home is here discussed and it is pointed out that "the three objects, then, for mothers to work for at home are house air as free as possible from dust, never above 68° in temperature, and frequently renewed from out of doors." Bathing and the care of the teeth, feeding and the care of the bowels, exercise, rest and recreation are all effectively discussed in their more general aspects.

In the second and third series of essays more emphasis is laid on the points at which the woman's efforts for sanitation extend beyond the home to be made effective in the field of public life. "Motherhood itself drives women out of their private homes into combinations of efforts for better enforcement of better laws for the sake of the children. The mother who has done wisely for her own must, even still for the sake of her own, help other mothers' children." Civic cleanliness, the inauguration of systems of medical inspection and in particular the sanitation of the schoolhouse itself are all problems which demand attention of this kind. "There are few things more illogical—it would be a hugh joke if it were not so terribly tragic—than for a government of fathers to collect all sorts and conditions of children away from their mothers, in public buildings cared for by ordinary working men (rarely by women) without training in housekeeping or health methods." "There are other calls on the mothers of the nation as great, but none greater than this, to keep schoolhouses as wholesome as the best homes."

The selection, education and supervision of janitors who play so important a part in determining the conditions of school life are rightly emphasized in these sections and in the two short isolated essays which follow them. Construction of floors, methods of cleaning, lighting, fresh air, the dangers of the common drinking cup and the importance of clean toilets are all discussed with vigor and picturesqueness and almost always with a fair and reasonable emphasis. A few points here and there are exaggerated. The increasing incidence of tuberculosis during school life is spoken of as if it were a case of cause and effect instead of an incident of progressive exposure to infection, much more out of school than in. There is also perhaps, a little too much weight laid on dust throughout, although it is pointed out that its danger lies not in the transmission of disease germs but in the mechanical injury to the mucous membranes which it causes.

The space devoted by Dr. Putnam to environmental conditions, to dust and windows and streets somewhat unduly outweighs the treatment of those personal habits of cleanness which are the main factors in the prevention of communicable disease. As Dr. H. W. Hill has pithily remarked "The old sanitation was concerned with the environment, the new is concerned with the individual, and finds the sources of infectious disease in man himself rather than in his surroundings." Yet so far as the environmental conditions themselves are concerned the book is sound and helpful and so well presented for popular reading that it should do a real service to the cause of public health.

C.-E. A. Winslow.

HEALTH DEPARTMENT REPORTS AND NOTES.

TO STATE AND MUNICIPAL HEALTH OFFICERS.

This new division of the Journal is specially designed to be of use to active Health Officers of the countries represented in the American Public Health Association. It will be unable to serve its true function unless the Health Officers are willing to coöperate by sending to the Journal copies of their reports, bulletins, new ordinances and personal information which will be of general interest. Furthermore it would be distinctly desirable if communications on subjects of general interest are submitted for publication in this division of the Journal. The management will further welcome any suggestions from Health Officers for the improvement of this division. All communications should be addressed to Selskar M. Gunn, Managing Editor, American Journal of Public Health, 755 Boylston St., Boston, Mass.

REPORTS.

Portland, Oregon.

The report of the Health Department for the year ending December 31, 1912 is very short and is composed almost wholly of statistics. It is unusually well planned, the tables being carefully chosen and arranged so that the report serves very well to demonstrate the value of statistical reports when they are used with judgment.

Portland is a city of 256,000 people of which 50,000 have been added in the past two years. The death rate has fallen as the population has increased, decreasing from 10.78 in 1910 to the enviable figure of 8.59 in 1912. The birth rate, 15.55, shows an increase over 1911 but a decrease from the 19.+ of 1910. The infant mortality and particularly the mortality from diarrhœa and enteritis has shown a steady and quite marked decrease during the past few years. This is attributed to the improvement in the condition of the milk supply and reference to the tables of average scores for dairies, creameries and milk depots bears out the statement. In 1912, 73.8 per cent. of the samples of raw dairy milk examined showed a bacterial count of less than 100,000 and 26.1 per cent. fell below 10,000.

Mr. Wheeler calls attention to the necessity of an additional garbage incinerator and urges that grounds be purchased for the erection of city hospitals for contagious diseases. The report makes no mention of inspection of schools or of the sanitary inspection of dwellings, restaurants, markets, etc.

Wilmington, Delaware.

Dr. Adair, President of the Board of Health, presents the report of the Secretary for the year ending December 31, 1912. The report is well prepared and carefully arranged but seems to indicate inadequate appropriations and equipment and a lack of a sufficient number of men to handle the work of a city of 92,500 population. Among the chief recommendations made by Dr. Adair are: (1) A reorganizaton which will place the milk inspector, meat inspector and vaccine physicians under control of the Health Department and (2) the establishment of a city laboratory. These recommendations need no comment except that they should have been carried out long before. Other suggestions which should make for improvement are the regulation and license of midwives, an increased appropriation for health work and the establishment of pure food inspection.

The Secretary of the Board is also Registrar of Vital Statistics and presents his report in good shape according to the Bertillon classification. In his report as secretary he indicates that the laws and ordinances are being enforced as far as the means permit and the death rate has shown a regular decrease since 1910, falling to 15.57 in 1912. Sanitary inspection of restaurants, bakeries, milk depots, moving-picture theaters, dwelling houses, and vacant lots and alleys is carried on and the orders of the board have been backed up by the arrest of several offenders. The abolishment of public drinking cups, the extension of medical inspection of schools, the erection of a municipal hospital and the introduction of a new system of garbage collection are urged as means of improving the sanitary condition of the city.

Augusta, Georgia.

The report of the Department of Public Health for the year ending November 30, 1912 is presented in a very readable, although in places a rather informal way by Dr. Murphey, the President of the Board and ex-officio Health Officer. While the report does not display Augusta in an altogether favorable light from the standpoint of public health, the causes of deficiencies are clearly stated and remedies outlined and urged.

The city has a population of 51,000 of which two-fifths are colored. The death rate for the whites was 14 per thousand and for the negroes 25.5 making a total rate of 18.6, an increase of 1.6 over 1911. The increase is explained by the addition to the city of a large section known as "the territory," populated wholly by negroes; without water and sewer connections, and in a very bad sanitary condition. "The territory" also bears the blame for an increased infantile mortality and a general lowering of the average sanitary condition of the city in all branches.

It is interesting to note that among the principal causes of death nephritis is placed first with 13 per cent. of the total and pneumonia second with 11.2 per cent. Tuberculosis stands fourth with 8.4 per cent. and Dr. Murphey severely criticises the policy of the city and county for making absolutely no provision for the care of the tuberculous. Cases cannot be admitted to the hospitals of the city on account of the danger of infecting other patients and the result is that the patient is kept at home without supervision so that he can and does infect those about him. Provision should also be made for cases of pellagra, which, under present conditions must also be treated in the home of the patient even when he becomes insane.

Surface closets have been abolished in all sections of the city where adequate sewerage exists and are being removed as fast as the system is extended. Fly and mosquito work is systematically carried on and the screening of fruit stores and meat markets is enforced, failure to comply with the regulation within ten days (allowed for getting screens ready) resulting in prosecution in the Recorder's Court.

District nurses and medical service for the poor are maintained and these together with a Health Exhibit which the Board devised have proved valuable in educating the lower classes to an appreciation of the value of sanitation. The chief food inspector during the six months of his tenure of office has made a preliminary survey of the sources of milk supply and is apparently doing good work in the education of the dairymen, both by suggestion to individuals and by the formation of a dairy school for which he has prepared a series of lectures. Inspection of markets, bakeries, and restaurants is also maintained although more men and money are needed on account of additional work occasioned by new ordinances. Brief reports of the work of the city laboratories for chemistry and for bacteriology and pathology are included as well as a statement of the work on medical inspection of schools.

The report is printed on good paper so

that it presents an attractive appearance and the last ten pages are devoted to a statement by the secretary of the Chamber of Commerce setting forth the advantages which Augusta offers as a business or residence city.

DEPARTMENT NOTES,

Right of Health Department to Confiscate Milk.

"The right of the Department of Health to destroy or confiscate milk without notification of the owner, and without giving him an opportunity to defend the purity of his product has never been tested legally, although it has at times been the subject of comment and discussion. A decision, handed down May 12, 1913, by the Supreme Court of the State of Wisconsin, upholds the Department of Health in such confiscation when milk is adulterated or below standard. As a matter of fact, at the present time the department confiscates and destroys only when milk is above a certain temperature or when it contains visible dirt, these two points being capable of immediate and satisfactory demonstration. In cases where adulteration is suspected, samples are taken and submitted to chemical analysis and, upon proof of adulteration, the dealer is prosecuted. The opinion of the Milwaukee court was delivered by Mr. Justice McKenna and affirmed the judgment of the Circuit Court for Milwaukee County, from which the plaintiff had appealed."

N. Y. Medical Journal, June 28, 1913.

The Vacant Lot.

"The Health Department is interested in the vacant lot. Each citizen in Louisville should be. No doubt there is one in *your* neighborhood, that has been a source of annoyance to you for some time, with its overgrowth of weeds and unsightly accumulation of filth. Probably there are children in the neighborhood, too, perhaps sitting disconsolately on the curbstone or playing in the dusty street. Why not utilize the vacant lots and solve two problems at once? Permission to use them can usually be acquired. The Health Department would like to see every vacant lot utilized as a garden and playground. Most of them are large enough to be divided in this way. A little neighborhood coöperation will do the work. Let someone get the larger children interested. See-saws, swings, coasters, and many other things can easily be made, and the children will have a playground on their own square. The lots will thus be cleared of rubbish and cease to be breeding places for flies and mosquitoes and will add to the attractiveness of the neighborhood."

Health and Hygiene, Louisville, (Ky) Department of Health.

A Strange Typhoid Outbreak at Paris.

"Recently there was a sharp local outbreak of typhoid fever in Paris. Investigations proved that the epidemic could be traced to the recent Physical Education Congress. During the preparation of the building for the sports exhibitions, a workman joined by mistake a Seine river water pipe to a drinking water pipe. Three weeks later several cases of typhoid, mostly confined to one neighborhood, were notified. The mistake cost the lives of twenty people."

The Medical Officer, May 10.

Preventive Medicine in Indiana.

"Indiana, always alert and in the forefront, purposes to make prevention a definite duty of the medical profession, and for that purpose to organize the entire body as aids to the state health department. Legislation is proposed that puts the moral and physical welfare of the state absolutely into the hands of the doctors. Education is the means, the law its weapon, and the scientific doctors its officers.

"No special expense to the state is involved, except some additional cleric force in Dr. Hurty's office. It is proposed to divide the state into as many sanitary districts as there are physicians, making the duties of each comparatively light. Annual reapportionment provides for changes. The duties of the physician are, to inspect in his district the children, homes, shops, public places, sewage, drainage, streets—in a word, to act as health officers. Children suffering and needing more care than the parents are able to afford are to be treated at the expense of the public. All diseases are to be reported, especially the contagious, and this includes the venereal. Those not reasonably cared for are to be isolated. Drug and alcohol habitués are to be registered, and excessive users to be published. Hopeless victims are to be isolated.

"District physicians are to inspect the plumbing, drainage, lighting, and ventilation, and the cleanliness of abodes, public places and shops. These reports are to be acted upon by the State Board of Health. The disposal of sewage, garbage, water, food, supplies, and market conditions are included. The control of drugs is also placed under the physician. The inspection of school children is extended also. They will be classified according to ability, and taught sanitation, hygiene, and anatomy, especially of the sexual organs.

"The power of sterilizing unfit males is placed in the hands of the State Board of Health. Crime will be studied, and this, with prostitution, drunkenness, pauperism, insanity, and other evils, be reduced as much as the development of the system proves to be possible.

"The Indianapolis Medical Society has accepted this program, and more than fifty of its leading members has indorsed it.

"Whether Indiana will accept so radical a measure remains to be seen. So many evils are assailed by it that the forces of darkness may be expected to rally in opposition. It will be noted that this follows the lines of the plan promulgated in these columns some time ago, to place the medical profession in the attitude of protecting the people against disease instead of waiting for its actual occurrence."

American Journal of Clinical Medicine.

Venereal Diseases and the New York Department of Health.

An important article from the pen of Dr. Hermann M. Biggs, General Medical Officer, has recently been issued by the Department of Health of the City of New York as No. 6 of the reprint series of the department, entitled Venereal Diseases, The Attitude of the Department of Health in Relation Thereto.

The requirement of notification of these diseases has already been referred to in the Journal.

Dr. Biggs states that "a compliance with the new regulations has been perhaps less general even than was the case in the beginning with reference to pulmonary tuberculosis, and the opposition has been greater."

Dr. Biggs continues to say that:

"The superintendents and the boards of trustees of some of the larger institutions of the city have failed to comply with the new regulations of the department, excusing their action on the ground that the notification of cases as required by the Department of Health involves so much clerical work that it is impossible for them to comply, as the physicians cannot do the work and no clerical staff is available for this purpose. Other institutions have declined to notify their cases because they were not in sympathy with the purpose and spirit of the regulations.

"The existence of large numbers of cases of venereal disease, and the terrible effects produced by them, is universally admitted. Still the medical boards of three large hospitals of the city have appointed committees to protest against the attitude of the Department of Health, and a joint committee representing them has addressed a communication to His Honor the Mayor, asking for his interference.

"Such opposition and such criticism were fully anticipated, and much more is likely to follow. The progress of sanitation, like the warfare of science, has been the history of a continuous struggle against opposition, carried on in the name of law, religion, personal rights, or expediency. The history of this struggle, like that of previous ones in science and sanitation, will end finally in a long delayed success, although the difficulties of the problem presented are much greater than has been the case in most previous instances.

"Early in January of this year, a circular letter was sent to every physician in New York City, requesting him to report the number of cases of venereal disease which had been under his care during the year 1912. Up to the present time the number of cases reported is as follows:

Syphilis	13,348
Gonorrhea	24,980
Chancroid	4,331
Total	42,659

"Let it be understood that these represent only the cases reported by 1,500 private physicians out of more than 8,000 in the city and do not include those treated in public hospitals, dispensaries, etc. They naturally indicate only a small proportion of the cases actually under the care of the physicians of this city during the year. It is probable that a large percentage of these cases were in the active, infectious stage. I think that 200,000 would be much nearer the real number of cases developed in the city during 1912. These figures, however, give a very inadequate conception of the character of the problem which is presented by the venereal diseases and its enormous importance to the health, happiness, and physical welfare of the people of the city of New York."

In conclusion Dr. Biggs outlines the policy of the Department toward these diseases as follows:

"*First:* The development and extension of the system of registration as at present conducted.

"*Second*: The provision of adequate facilities for the early diagnosis and general supervision of all forms of venereal disease.

"*Third:* The institution of an extensive campaign of education in relation to sex hygiene, and the causes, prevalence, danger, and results of such infections and the means for their prevention and treatment.

"*Fourth*: The provision of hospital accommodation for such cases as constitute a menace or which can find no facilities elsewhere for their care. . . . .

"I venture to say that when the anti-tuberculosis movement began in this city some twenty years ago, no one anticipated the vast organization of social forces that would be developed to cope with this disease. As the campaign progressed, first one and then another agency was enlisted, and as the problems presented themselves they were met in the light of existing knowledge and experience. Exactly the same situation confronts us in the control of the venereal diseases, and while the initial steps seems quite clear, I do not for a moment hestitate to say that the further development of the campaign must await further knowledge—knowledge to be obtained only through the results of experience."

The "Fever Ship."

"In March, 1912, Director Sawyer reported to the Board upon a remarkable recurrence of typhoid fever on a ship, which had covered a period of more than three years. Briefly stated, a series of nearly thirty persons (members of the crew of this ship at the time they were taken ill) suffering from typhoid fever had been taken from a certain ship. Several deaths had occurred, and the frequent intervals at which these men were removed so impressed the sailors that it became difficult to maintain a full crew. The ship became known as the 'fever ship.'

"Every source of infection outside the ship was eliminated, and finally it was decided to begin with the captain and go through the entire crew in a microscopical search for a 'typhoid carrier.' This laborious task was rewarded by the discovery of one seaman, the winch driver—the ship was a lumber vessel engaged in coastwise trade—who was a carrier. This man was removed from the ship and placed in quarantine. Through the coöperation of the United States Public Health Service he was kept under observation and treatment in the San Francisco Marine Hospital for nearly six months—*not treatment and observation to benefit him, for he was already well physically,* *but treatment to render him no longer a source of danger to the public.*

"At the end of this period it seemed justifiable on the basis of these observations to release him on condition that he report every two weeks. Within two months after his release three more persons developed typhoid fever on another vessel upon which he shipped as a seaman. One of this number died. Investigation showed on this ship the same conditions of a common water barrel and common cup, believed to have been the chief source of this typhoid-carrier's transfer of his disease to the first series of victims. He was again returned to quarantine and other measures which science has suggested are being tried in an effort to eradicate the typhoid bacilli from their residence in his alimentary tract. No cases of typhoid fever have originated among the crews of either vessel since his removal.

"The fine quality of citizenship which has been displayed by this man throughout the past year of quarantine-imprisonment can not be too highly praised. Here is a man who five or six years ago contracted typhoid fever and paid the cost in illness and who subsequently through no fault of his own, has become a menace to the health of the general public. Had his occupation been on land, and one which caused him to shift from town to town, it is probable he would never have been detected under the imperfect administrative health organization our cities and counties maintain. Our records would only have shown a steadily lengthening series of 'sporadic' cases of typhoid fever which no one could explain. Instead of the thirty-one known cases and five deaths caused by this man we might have actually had many times this number of unknown cases due to him.

"The human disease 'carrier' presents many new and difficult problems to the health departments. This typhoid carrier illustrates some of these problems. Shall this man be permanently quarantined unless methods can be devised for rendering him no longer dangerous to the public health? The public demands that this be done in the control of leprosy; it hesitates to require any measures in this direction in the control of tuberculosis; it refuses thus far to seriously consider adequate measures of any kind in the control of syphilis. What will be the public verdict in cases of typhoid carriers?"

Bulletin California State Board of Health, April, 1913.

The Standard for Milk.

"The standard for milk now in vogue in Ohio is based upon the results of analysis of many samples taken from the numerous varieties of milch cows and is simply the composition of the poorest possible milk that a cow in a normal healthy condition can give, viz., 3 per cent. butter fat, 9 per cent. solids not fat, 12 per cent. total solids. These standards have been adopted quite generally by the municipalities of the State, but in some cases there seems to have been certain exceptions; that in the months of May and June a standard of 2.8 per cent. butter fat, 11.50 per cent. total solids, 88.5 per cent. water is allowed. The records of analysis of many samples of milk during the months of May and June in this laboratory show a standard such as the above to be ridiculous. This standard seems to have been allowed on the theory that the great succulency of the grasses and food during these months naturally diluted the milk and was therefore weaker when obtained from the cow. This condition is rare, but on the other hand it permits those who dilute and standardize their milks to reap an abundant profit during these two months by removing the fat or increasing the volume, by the addition of skim milk, etc. The original standard, in my opinion, is low enough and should maintain throughout the year."

Wm. McK. Reed in the Toledo Sanitary Bulletin, July, 1913.

Better Tenements.

"Remarkable strides have been made in the enforcement of Louisville's splendid Tenement House Law since the appointment of Special Tenement House Inspector James Montgomery. No less than two hundred and fifty bad tenements have been put in livable condition as to better roofing, papering, plastering, painting, adequate toilet facilities, sufficient water supply, overcrowding, etc., since his appointment in December, 1912.

"The housing problem is a many sided and difficult one, and fraught with many evils to the community; evils of a social, economic, sanitary, civic and moral nature, and its solution is dependent upon many things—proper laws, capable officials, the social worker, education, an interested public, the property owner and the tenant, and it requires coöperative work.

"All tenements, which also covers the better class of apartment houses which have been erected since the passage of the tenement house law, have been modeled strictly according to its requirements, as the plans have been closely scrutinized by the Health Department before a permit was issued.

"The main problem now is in dealing with those tenements which existed prior to its passage. It is with these wretched dwellings located on the dim, grey streets, behind other streets, with which the Health Department is now busy, and it is the aim to abolish as many of these tenements as possible. Many of them can never be put in proper repair, and when such a case is found, the owner is instructed to have the premises vacated.

"Another difficulty lies in the fact that it is not always the owner who is responsible for the deplorable conditions found. Often he is willing to put the house in repair, but the tenants tear down as fast as he builds up—burn the new steps and fences, knock holes in the new plaster, and tear off the new paper. Education here is the only means by which anything constructive will be accomplished, and education of the children is, in the writer's opinion, the most potent influence.

"As long as it is necessary to pass laws and issue orders to compel persons to clean and ventilate the places they live in, so long are we far distant from that pinnacle of civilization we like to brag about."

Health and Hygiene, Department of Health, Louisville, Ky., July, 1913.

Picture Palaces and the Spread of Disease.

"Last year in the borough of Nelson school closure was resorted to during an epidemic of measles, and this brought into prominence a new factor in the present-day facilities for the spread of infection, *i.e.*, the picture palaces. 'These exhibitions,' writes Dr. A. Pollock Millar, M.O.H., 'gather together crowds of children nightly in conditions much more favourable to the spread of infection than modern school premises offer, and it is a matter for serious consideration by authorities responsible for the health of the public whether circumstances warranting a resort to school closure should not also permit of the compulsory exclusion of children of school age from these exhibitions for a like period."

The Medical Officer, May 10.

Pardonable Pride.

Asheville, N. C., is proud of its 1912 typhoid fever record and the following clipping taken from the *Bulletin* of the Health Department would certainly indicate that this pride was justifiable.

"It is a great pleasure for us to state that death from typhoid fever is represented by the minus sign in Asheville for the last twelve months. We did not have a single death from typhoid fever during the year 1912.

"The number of people sick with typhoid fever in Asheville is also worthy of mention. We had only fifteen cases to develop in Asheville during the year 1912. Ten of these were people whose homes were here, but who were in business away from here, and were taken sick and came home on that account, being reported ill with typhoid fever within ten days after their return to the city. These cases are spoken of as 'imported.' The other five cases developed in the city and we were unable to trace the cause.

"The average death rate for typhoid throughout the United States for 1910 was 23.5 per 100,000, at which rate we would be due to have about five deaths, or to be accurate 4.7 deaths.

"However, typhoid fever is more prevalent in Southern cities and the death rate is much higher. The average death rate for North Carolina cities in 1900 was 57.7, at which rate we would be due to have 11.5 deaths from typhoid, more than twice as many as we had cases develop in 1912. For 1910 the death rate in North Carolina cities had been reduced 2.2, the death rate being 55.5, at which rate we would be due to have 11.1 deaths from typhoid which is still 200 per cent. more, (not than our deaths for we had none in 1912) but 200 per cent. more deaths from typhoid in 1910 than we had cases develop in Asheville last year. The average death rate for typhoid in North Carolina cities seems to be about the average for Southern cities."

Trade Unions and Health Conditions.

The following article clipped from the English "Medical Officer" gives a rather valuable suggestion to health officers in this country.

"A welcome sign of the times is the increasing tendency of trade unions to interest themselves in matters of sanitary administration. Members of the public health service naturally rejoice at any evidence of the awakening of intelligent criticism, which is bound to assist them in securing the adoption of measures they know tc be necessary to the well-being of the community. A recent example of the vigilance of trade unions comes from Raunds, in Northamptonshire, where the district council has been inquiring into certain representations forwarded by the National Union of Boot and Shoe Operatives. The union in a courteous letter had alleged that tuberculosis was increasing in the district, especially among young persons, and suggested that this was due to insanitary conditions in workshops and factories. In this particular case, Dr. William Mackenzie, M.O.H., was able to show that the union was misinformed, and that not only was there no increase in the number of cases of phthisis in Raunds, but that actually the district compared favourably with other similar areas. In the course of a discussion arising out of Dr. Mackenzie's report, certain statements were made regarding the habits of some members of the working classes which anyone acquainted with factory conditions must know to be well-founded. It was alleged that the decent sanitary conveniences provided by employers are grossly abused by some of the workmen, who spit about the floors and otherwise render these places filthy and repulsive. We commend this matter to the notice of trade unions, who can do so much to put an end to conditions that must be very distressing to self-respecting working men. We often feel that the British working classes, who in so many respects are an example to the rest of the world, are grossly lacking in consideration towards their neighbours. To take only one example, we would refer to their habit of travelling backwards and forwards to their daily labours in clothes covered with oil, paint, whitewash or mud, regardless of the fact that they share the same public conveyances with those who are obliged to go about in black coats or soilable dress materials. On the Continent working men show a less selfish spirit, and a cleanly suit of overalls put on over dirty clothes enables them to enter train or omnibus without injury to the garments of their fellow travellers. With the awakening of a health conscience in the trade unions now becoming manifest we may hope that such abuses as we have mentioned may quickly disappear."

PUBLIC HEALTH NOTES.

Plague Prophylaxis in China.

"A German navy surgeon tells how he kept the plague out of Kiaochau, the Teutons' look-in in China. The boundaries were guarded by a barbed-wire fence with 300 men back of it; the water-front, by guard-boats and searchlights. But one opening for admissions was left. At the market, buyers and sellers were separated by two wire fences five feet apart. All incoming travelers were examined at quarantine and detained under observation for five days. Trusty persons then admitted had to report daily for five days more. Doctors, attendants and sextons were protected with motor-goggles, cotton-masks over the nose and mouth, a hooded suit with gauntlets, and long boots. On leaving the ward, a spray of sublimate solution was applied and the clothes were well brushed. The suit was then shed and soaked in an antiseptic lotion. Then he was allowed to go free."

American Journal of Clinical Medicine, June, 1913.

The Smoke Nuisance.

Agitation for the abolishment of the smoke nuisance usually meets with opposition from the manufacturers who object on the ground that it would add to their expense to introduce smoke consuming devices. In view of the numerous anti-smoke crusades now going on the following figures compiled by the University of Illinois Engineering Experiment Station may be of interest. A so-called "smokeless boiler" was used and the tests showed that the density of the smoke emitted was well within the limits of the strictest ordinance likely to be passed. The tests of efficiency were made with six different coals and each was tried in both the smokeless and the regular type of boiler. The detailed results of the test follow:

	Smokeless efficiency Per cent.	Regular efficiency Per cent.
With Iowa slack	47.1	39.5
Iowa slack	57.9	43.3
Illinois mine run	59.3	48.5
Illinois nut	67.0	56.1
Illinois lump	74.3	65.2
Pocahontas	74.9	57.2

There is a general campaign for smoke abatement now going on in England especially in the large manufacturing cities. Dr. W. L. Hawkley writing in *Public Health* presents a thorough discussion of the subject and closes with these recommendations:

"1. That those engaged in the Public Health Service do their utmost to encourage public interest in the subject of atmospheric purity, by advice to their authorities; the introduction of popular lectures, exhibitions of smoke prevention appliances, and classes for those in charge of furnaces.

"2. That Local Authorities should, if possible, establish classes on the lines of those already held in London, Liverpool, Manchester and Glasgow for the instruction of engineers, firemen and others concerned with boiler management.

"3. That a certificate of proficiency should be granted to those who have attended such a course and who have passed a simple examination at its conclusion.

"4. That employers should be encouraged to require the production of such a certificate from any person applying for employment as an engineer or fireman.

"5. In places where smoke inspectors do not exist, they should be appointed. They should be men of special experience and have had instruction in theoretical and practical considerations of smoke abatement.

"6. The price of gas and electricity for factory and domestic use should be kept as low as possible.

"7. In offices, flats, public buildings and institutions a scheme of central heating and hot water supply should be insisted upon.

"8. Support should be given to the Bill promoted by the Smoke Abatement League when it is introduced.

"9. The Local Government Board should enforce their powers with regard to the prevention of smoke under existing legislation where Local Authorities refuse to take any steps in the matter."

Pellagra.

Dr. William H. Harris of New Orleans writing in the *Journal of the American Medical Association*, June 21, gives a preliminary report on the experimental production of pellagra in the monkey. While the experiments hitherto completed are not planned to throw light directly on the modes of infection among humans, they are certainly a step toward the solution of the problem.

The infectious material was prepared by macerating and filtering portions of the skin, alimentary tract, brain, and cord of a human patient dead of pellagra and the inoculation was given in all cases intercranially, subcutaneously and intravenously. Typical lesions and ultimate death were produced, but only after an incubation period of several months. Dr. Harris draws the following conclusions:

" These experiments would indicate that pellagra may be transmitted to the monkey (*Macacus rhesus*) by means of a Berkefeld filtrate derived from the tissue of the human subject; at least, the animals develop all the essential clinical signs nd symptoms together with the pathologic picture discerned in the disease in man. Furthermore, they suggest that the etiology of pellagra is a filterable virus or a micro-organism capable of passing through the pores of certain Berkefeld filters. The details of this work and the further experiments which have been undertaken with a view of determining the nature of this filtrate and other phases of the problem will appear in a subsequent publication."

Municipal Laboratories.

A short article by Dr. Park, Commissioner of Health at Rockford, Illinois, deals with the purpose and value of a municipal laboratory. He closes with these words of advice to city governments:

"Do not be deceived into thinking that this is a subject that has been overdrawn. Remember that it is war—grim, bloody war—between the armies of Life and those of Death. Cities which yearly spend thousands upon thousands of dollars for such luxuries as parks and libraries, should not turn a wry face when the question of appropriating for a laboratory comes up.

"Let not the laboratory be considered merely the study-room of the impractical, pedantic savant—let it rather be the battlefield upon which the shining sword of Science fights for human life and health."

Milwaukee's Tuberculin Test Ordinance Upheld by Supreme Court.

What is probably one of the first and at the same time most far-reaching decisions dealing with tuberculosis ever given by the United States Supreme Court, was recently handed down, when Milwaukee's famous tuberculin test ordinance was upheld by that body. For the first time in the history of the United States, at any rate, the question of whether a city or state may prevent the sale of milk from cows that have not been subjected to a test for tuberculosis has been decided by the highest tribunal in the land.

The Milwaukee Tuberculin Test ordinance was drawn by Mayor Bading when he was health commissioner of that city in 1907, and after a year's fight with the dairymen, the ordinance was adopted by the common council in 1908. The association of dairymen, at once took the matter to the Circuit Court on questions including the reliability of the test, and after a long period in which data on the subject was gathered in many eastern laboratories, the case was tried and the ordinance upheld.

After defeat in the Circuit Court, the case was carried to the state supreme court, and then to the United States Supreme Court, where the final decision is now given. The court upholds the following contentions of the city: That human beings are subject to infection from bovine tubercle bacilli; that the bovine bacilli have as great disease producing power as the human bacilli have for human beings; that the bovine bacillus produces the same pathological condition in the human body as the human bacillus; that tuberculosis is transmissible to human beings through the use of milk and its products as food; that tuberculosis prevails in cattle in the vicinity of Milwaukee; that bacterial examinations are not sufficient, and that while the tuberculin test is not absolute, it is the only reliable and trustworthy diagnostic agent for determining the presence of tubercle bacilli; that a tuberculin test applied to cows outside of Milwaukee, from which cows the milk of the city is drawn and shipped into the city, is a reasonable requirement. The injunction against the application of the test is dissolved by the decision.

Fall in Berlin's Death Rate.

A remarkable paper showing the decline of the tuberculosis death rate in Berlin is contributed by Prof. A. Kayserling in "Tuberculosis" (Berlin) for April. The paper is entitled "Statistische Beitraege zur Tuberkulose—Assanierung der Stadt Berlin."

Professor Kayserling goes back to 1822 for his records although most of his paper deals with the period between 1855 and 1911. He distinguishes two periods in the course of the tuberculosis mortality curve. In the first cycle between 1855 and 1886 there was no decided decrease in the tuberculosis death rate, it remaining about 32 per 10,000 living throughout that period. With the year 1887, however, the curve begins to show a decided drop, which continues more or less regularly up to 1911. In 1886, out of an average population of 1,339,956 in Berlin, 4,318 people died of pulmonary tuberculosis, while in 1911, with an increase of 730,000 population to 2,071,940, the number of deaths was decreased by 599 to 3,719. The death rate in 1911 was 17.95 per 10,000 population as against 35.11 in 1855 and 29.72 in 1887. Professor Kayserling finds also that the decrease in the last twenty-five years is manifest for both sexes in every age period with the exception of females of more than 70.

Mosquito Device.

"An instrument for the detection of the direction of flight of adult mosquitoes has been invented by Mr. E. Frederick Quimby, division inspector in the Department of Sanitation. It consists of a metal frame holding four plates of glass each 12 by 12 inches in size, placed upon a tripod. The glass plates are held stationary at right angles to each other so that when the instrument is set up, they point north, east, south and west. To catch the mosquitoes a coat of tanglefoot, composed of one-half pound of rosin to one liter of castor oil, is prepared, and when applied to the glass is practically transparent.

"The first experiment with the instrument was made west of oil tank No. 62, at Mount Hope, on March 8. It was set up at 6.30 p. m. The first mosquitoes were noticed at 6.35 p. m., and were *culex* coming from the east in a straight line. The *anopheles* flight followed at 6.40 p. m. from the same direction, but these mosquitoes were moving low and slow in zigzag flights, as if seeking lulls in the wind. The first mosquitoes caught on the plate were noted at 6.55 p. m. At this time the wind was blowing at a velocity of 19 miles an hour from the north, but between 7 and 8 o'clock it increased to 25 miles an hour, still from the north. The first mosquitoes were caught on the east side of the south plate, but a few minutes after 7 o'clock, adults were caught on the north side of the east plate. The flight stopped at 7.15 p. m., and no adults were caught until 8.05 p. m.

"An all-night test was made on the night of March 13 and morning of March 14 on a point of land, situated between the French and East Diversions, about 1,000 feet west of the power house at Gatun. During this experiment, the following points were brought out: That the adult *culex* and *anopheles* flew on the quarter of a 17 to 19-mile wind; that the evening flight occurred between 6.10 and 7.10; that there was a complete lull in the flight after 7.10 o'clock; that there was a return flight between 5.50 and 6.40 in the morning, also on the wind's quarter; that the mosquitoes fly much higher and swifter in the morning than they do at night; and that, with possibly few exceptions, only adult females are in flight.

"On the night of March 19, and morning of March 20, another all-night test was conducted at the same place as above. During this experiment an *anopheles* mosquito was caught for the first time on the opposite side of the plates from the direction of the flight. This adult was a male, the only one captured during the experiments up to that date. It is believed that this male may have been flying about aimlessly when caught. The instrument has proved to be useful in locating breeding places by eliminating the area facing the plates that do not show a catch. It also identifies the species of mosquitoes in the dark, as well as in the light, thereby determining the direction of flight, if any, during the night. Experiment shows that there is no direct flight during the night, after a certain period. Further this is the first time that a return flight has been recorded on the Isthmus; and it was shown to take place within a period."

The Canal Record, June 13, 1913.

Vaccines for Whooping Cough.

A valuable paper on this subject from Dr. E. Mather Sill appeared in a recent number of *American Journal* of Diseases of Children. Dr. Sill states that:

"Thirty-three cases of whooping-cough were treated with the pertussis vaccine, and in all the effect of the vaccine was to diminish markedly the number and severity of the paroxysms and the amount of vomiting.

"Absolutely no untoward effects from the use of the vaccine were noted. There were no complications in the cases in which the vaccine was used. No abscess formation, or even slight temporary inflammation or swelling at the site of the injection, and no general constitutional symptoms occurred. The longest time any of the children coughed was twelve weeks and four days. The longest time any child coughed after it was put under vaccine treatment was nine weeks and one day, the average length of time being four and one-half weeks. The injections were given every two or three days in most of the severe cases, and in the very severe cases every day for a few days, until the symptoms were relieved; the milder cases did not receive the vaccine so often nor so much at a time.

"The cases that were seen early in the attack, before the paroxysms had attained their height, seemed to respond more quickly to treatment and their course was shorter. In all cases, however, after one to three injections, the number and severity of the paroxysms was markedly lessened.

"Some children seemed to respond better to treatment than others, and I attribute this to the fact that the dosage was given irrespective of the age; therefore, the younger children got a larger dose proportionately, and as a rule these latter were the ones that responded most quickly to the vaccine and had the shortest attacks after treatment was begun. This fact is important, since (heretofore) these young babies are so apt to have pneumonia complicating or accompanying pertussis, with fatal results."

In connection with the use of vaccines for prophylactic purposes Dr. Sill makes the following comment:

"A very interesting fact is that prophylactic treatment was instituted by giving immunizing doses of pertussis vaccine to children in a family in which one of the children was under treatment for whooping-cough. These children were watched over a period of two months, and although they had never had whooping-cough and were constantly exposed to the disease, did not contract it. It would seem, then, that the vaccine confers immunity to the child injected with small doses. One child of 5 years was given four injections of twenty million bacteria each, over a period of one month; another in the same family, 3 years of age, got nine injections of twenty million each, over a period of one month; neither child developed pertussis."

Mortality According to Marital Condition.

"The State Health Department has been collecting statistics regarding the mortality rates as connected with the marital condition during the past three years outside of Buffalo and New York City. The most obvious fact indicated by these statistics is that the death rate for husbands is much lower than for single men at each age group except the highest, where it is about the same. The percentage of difference is the greatest at the ages 30–39 and 40–49, where the death rate of husbands is somewhat less than one-half that of bachelors. The table shows that the death rate of widowers and divorced men is considerably higher than that of husbands of the same age, and between 30 and 80 years not far different from the death rate of bachelors of the same age. The table shows further that the death rate of wives is lower than that of single women of the same age, the only exception being between the ages of 20 and 29, which is perhaps in part due to the influence of child bearing at those years and in part to the greater average age of wives in that group. The mortality of widows and divorced women is as a rule higher than that of spinsters. From the standpoint of mortality marriage is of less benefit to women than to men."

New York Correspondence, Journal of the American Medical Association, July 12.

Purification of Oysters.

"Of all the means for preventing the use for food of contaminated oysters, 'stabulation' or deposit of the oyster in pure water for sufficient time before their use seems by far the simplest and most rational. Fabre-Domergue, inspector general of the fisheries, proposes the use for this purpose of basins fed with filtered water, removed often enough to insure complete evacuation of the liquid contained in the shells and of the matter in their digestive apparatus. He recently read a paper before the Académie de médecine on the results obtained by this procedure. It may be considered as an established fact that the procedure insures the purification of the mollusk in six or seven days and that it makes it unnecessary to fear any infection from them."

Paris Letter, Journal of the American Medical Association, July 12.

Growing Interest in Social Surveys.

"Interest in the social survey as a means toward city improvement grows apace. This is definitely shown by the fact that citizens and organizations in as many as 100 cities, scattered through 34 states, have requested the Department of Surveys and Exhibits of the Russell Sage Foundation either to come and survey them or to advise them in starting a local survey movement. Many of these requests are backed by the local commercial organizations, chambers of commerce and boards of trade. The value of the survey from a business point of view—in giving the city commercial advantage through making it a better, healthier and more comfortable place to live in—is receiving increasing recognition in these quarters.

"Two kinds of field work in surveys have been engaged in by the department—'pathfinder's surveys' and 'preliminary surveys.' The former are quick diagnoses of local conditions showing the need of the longer and more intensive survey. They gather enough local facts to indicate the main lines of investigation which should be taken up later, the probable time necessary and the probable cost. The preliminary survey is aimed at three kinds of results: First, to furnish a sufficient body of local facts to permit the planning of an intelligent program for community advance for the next several years; it not only shows liabilities, but community assets—the forces to build on and to build with, as well as what to build. Second, it is a means of enlisting public support for measures which champion human welfare. Third, it collects sufficient data to point out the problems which need thorough or continuous investigation."

The American City, June, 1913.

Hygiene and Housing Congress.

"The fourth International Congress for the Hygiene and Salubrity of Dwellings will be held at Antwerp from August 31 to September 7, the three previous Congresses having been held at Paris, Geneva and Dresden. The term 'dwellings' is understood in its widest sense, and is held to include all premises used for a shorter or longer time by human beings. The Congress will be divided into the four sections: Hygiene of Emigrants, Colonial Hygiene, Hygiene of Ports and Ships, and Development of Towns from the Hygienic Point of View. In the first section the questions down for discussion are: Transport by rail from the place of origin of emigrants, medical inspection on arrival, lodging on land, hotels, private houses, boarding-houses, foundation of special house-complexes or of caravansaries, advantages and inconveniences, and transport by ships, drinking water, clothing, and night-quarters. The subjects specially to be considered in the second section are: Private dwellings, collective dwellings (mining enterprises, plantations, and so forth), and infirmaries and hospitals. The section specializing on the hygiene of ports and ships has on its programme for discussion: Means to prevent the contamination of navigable waterways, prophylactic measures against the introduction of exotic contagious diseases, sailors' homes, passenger ships, and men of war. The fourth section will consider the point of expropriation on account of insalubrity, a subject which is also to be discussed at the immediately following meeting of the tenth International Congress of Cheap Dwellings at The Hague. The President of the Congress will be Dr. Victor Desguin, the President of the Royal Belgian Society for Public Medicine, and it is expected that, as on the three previous occasions, it will be attended by representatives of the principal foreign Governments and municipalities. Arrangements have been made for the International Exhibition at Ghent to be visited and for a tour in Holland after the Antwerp meeting. Applications for membership of the Congress should be addressed to the treasurer, Mr. A. Cols, Willem Tell Street 3, Antwerp."

The Medical Officer, June 21.

Air Conditions in Schools.

"A few sanitarians have already begun this study of existing air conditions in school houses. A notable report, preliminary, it is hoped, to still more extensive studies, was presented last month to the Committee on School Inquiry of the Board of Estimate of New York City by Charles J. Armstrong, Consulting Engineer, Prof. Charles Baskerville and Prof. C.-E. A. Winslow of the College of the City of New York. This describes the results of investigations made in five school buildings, two in Manhattan, two in Brooklyn, and one in the Bronx. Between April 19 and June 7, 1913, many observations of temperature, humidity, dust and bacteria were made. The main conclusions from these studies of indoor air are stated in the report as follows:

"(1) Overheated and over-moist air is the principal cause of discomfort and injury to health in ill-ventilated rooms.

"(2) In four of the five schools studied the average temperature was over 70 degrees, indicating a distinctly undesirable condition of affairs.

"(3) In the three new school buildings, not in crowded districts, 15 per cent. of the records showed comfortable conditions outside and overheating within, while in the two old buildings located in tenement districts this percentage rose to 54 per cent.

"(4) Bacterial counts show a range of 0 to 150 colonies falling on a plate of 9 square inches in three minutes. Of the 30,000 colonies on the plates only ten were characteristic mouth organisms, indicating that most of the bacteria present are harmless.

"(5) Dust counts in the school room air ranged from less than 200,000 to about 2,000,000 particles per cubic foot. The average for individual schools ranged from 610,000 to 760,000, while the average for outdoor air was between 800,000 and 950,000. The highest indoor values were in the two old buildings in tenement districts.

"Too much stress cannot be laid upon the cleanliness of the air forced into a building. Recent experiments made by Melville C. Whipple, Instructor in Sanitary Chemistry in Harvard University, have shown that air near the street level in our crowded cities is not fit to be distributed indoors unless it be first purified. The upper air is much cleaner and contains fewer dust particles and fewer bacteria. This lends some weight to the arguments of those who advocate window ventilation in place of mechanical circulation. But air can be purified and ventilation plants can be designed so as not to be deranged by the occasional opening of a window. Thus far ventilating engineers have given all too little attention to the quality of the air supply from the standpoint of cleanliness. They would do well to follow the methods of the water supply engineer who plans to furnish water in its natural condition when it is sufficiently pure and wholesome, but who does not hesitate to utilize an impure supply after adequate purification.

"One of the interesting facts brought out by Professor Winslow's studies of air bacteriology was the comparative absence of harmful bacteria in the air of school rooms. Out of 30,000 colonies observed, only 10 proved to be of a type commonly found in the mouth, or, in other words, most of the bacteria found were probably harmless. But considering the large amount of air that is drawn into the lungs of a human being during the course of a day, even a small percentage of objectionable bacteria in the air may be not without significance. The report states that, on an average, school room air contained about 700,000 dust particles per cubic foot. How enormous, then, the numbers of dust particles inhaled in the course of a day! And how important it is not only that the air forced into a building be clean, but that proper methods of floor cleaning and dust removal be adopted."

George C. Whipple in the American City, July, 1913.

Treatment of Pediculosis Capitis.

The *New York Medical Journal* makes the following comment on an article in the *Lancet* which should prove of interest to those who have to handle the problem of pediculi in the public schools.

"Arthur Whitfield, in the *Lancet* for December 14, 1912, describes a procedure by which pediculi of the head in female children can be rapidly exterminated. The patient is placed on her back on a bed, with the head hanging over the edge, and the hair resting in a basin placed on a chair. The following solution,

℞ Phenolis, ... ʒiii (12 grammes);
Aquæ, ... Oi (500 grammes).

is then poured over the hair into the basin and sluiced backward and forward until the whole of the hair is thoroughly soaked with it. Saturation of the hair over the ears and at the nape of the neck should especially be secured, since these parts are the sites of predilection of the parasites. The sluicing is to be carried out for ten minutes by the clock. The hair is then lifted from the basin and allowed to drain, but is not dried or even thoroughly wrung out. The whole head is then swathed with a thick towel, or better, with a large piece of flannel, which is fastened up to form a sort of turban. The head is allowed to remain thus for an hour. It can then be washed or simply allowed to dry, as the phenol, being volatile, quickly disappears. At the end of this period every pediculus and, what is more important, every ovum, is dead. The hair itself is not in the least damaged."

This method has met with so much success where it has been tried in the English schools that it is being generally adopted. As an additional means of prevention parents are supplied with free disinfectants to disinfect hats, clothing, beds, bedclothes, towels, etc. In some cases a man is sent to spray the rooms and bed with a disinfectant.

Cigar Cutters.

"The attention of the bureau has been invited to the danger of the spread of disease through the automatic cigar cutter which one finds so commonly on the counters of cigar stores, drug stores, and other places where cigars are sold. It is a habit among many cigar smokers on purchasing a cigar to place it between their lips while paying for the purchase, the smoker then putting the moist end of the cigar in the cutter. This would seem to be a very effective method of bringing about the interchange of mouth secretions, and possibly the spread of infection. It is suggested that the use of such automatic cigar clippers should be avoided by the public because of the possibility that disease may be spread by them by reason of the nature and manner of their use."

United States Public Health Reports, July 11, 1913.

Disinfecting Laboratory Wastes and Autopsy Washings.

Dr. W. D. Fullerton writing in the *Cleveland Medical Journal* comments on the peculiar inconsistency in the methods of supposably trained and careful workers by which the washings from autopsy tables and laboratories are allowed to run directly into the sewers with a disinfection which is often superficial and in some cases wholly absent. He suggests an attachment to the common table by which all washings drain directly into a can of water which is kept boiling. He has experimented with various methods and submits the following conclusions.

"1. It is grossly negligent and inconsistent with modern medicine to contaminate sewage with infected autopsy washings, and thereby frequently to expose entire communities to infection, directly or indirectly.

"2. The washings from every autopsy where an infection is present should be sterilized, by one of the methods suggested or otherwise, before consigning to the sewer.

"3. Sterilization by heat, when all cases are considered, is the most rapid, thorough and convenient and accomplished with least labor.

"4. If a supply of live steam be not constantly at hand, natural or artificial gas is the cheapest means. When these methods cannot be employed Liquor cresolis compositus or formalin are the best agents to use, though other disinfectants may be employed."

Purified Advertising.

Following in the steps of the ordinances preventing the misbranding of food and drugs and in line with the fight against fake "cures" for consumption and all other ills to which the human body is heir comes the following note of progress from *Municipal Engineering* for July.

"An ordinance prohibiting untrue and misleading advertising has passed the Los Angeles city council. This ordinance gives those who have been fighting for honest publicity an efficient weapon with which to force their object.

"This ordinance follows closely and is modeled on the famous 'Printer's Ink' statute, drawn by Attorney Sims of New York City, and already is a state law adopted in Washington, Minnesota, North Dakota, Indiana, New Jersey and Nebraska. It makes it a misdemeanor for any firm, person or corporation, to make or disseminate any assertion or fact concerning merchandise or service which is untrue or misleading. It covers every possible avenue of publicity, including newspapers, magazines, circulars, form letters, open publication, billboards, signs, labels, electric signs, window cards or by any advertising device or proclamation. A fine of from $25 to $500 or an imprisonment not exceeding 180 days or fine and imprisonment is provided for violation.

"For more than a year the advertising club has been working with the backing of more than one thousand leading business men and more than a half dozen of the best civic organizations for some law which would put a stop to the fake sales that have often been carried on in Los Angeles. During the past few months nearly a score of prosecutions have been brought chiefly against fake auction sales and clothing concerns. At the present time the operations of these classes of business houses have been practically stopped and with a new ordinance in good working order it is expected that fake advertising will be put a stop to for all time."

Sterilization of Milk by Electricity.

"Towards the close of 1911 Alderman Shelmerdine, chairman of the Infant Life Prevention Sub-committee of the Liverpool Health Committee, approached the bacteriological department of Liverpool University with the view of ascertaining whether electricity could be satisfactorily utilized for the sterilization of milk, and whether such a process possessed any advantages over the existing system of pasteurization. The department forthwith devoted considerable time to the task of evolving suitable apparatus for the conduct of experiments. Twelve months later, Dr. J. M. Beattie, the city bacteriologist, was able to inform Dr. E. W. Hope, M.O.H., that the results obtained justified the health committee in recommending the city council to instal a small electrical plant in the bacteriological laboratories in order that more experimental work could be carried on. The plant was installed by the city electrical department and handed over to the university some three months ago. The sterilizing process, apart from the engineering requirements, is simple in character. The milk is allowed to enter at one end of a tripartite tube of definite size from a known fixed level, and during its passage through the tube, which occupies a known time, is acted upon by the electric current.

"During the last three months further trials have been conducted by the bacteriological department of the university, and in the course of the last few days Dr. Beattie has issued a report which bears testimony to interesting results.

"Dr. Beattie asserts that the electrical method of sterilization is more economical than, and free from some of the objections urged against, the older method. He points out that the invariable result of the electrical experiments was the complete destruction of all colon bacilli and bacilli of similar nature, with an enormous reduction in the total number of bacteria of all kinds. 'We have proof,' he says, 'that the organisms (*B. coli* and its allies) which are chiefly responsible for summer diarrhœa among children, are killed, and that milk sterilized by this process is rendered eminently fit for infantile use. The keeping qualities of the milk are, moreover, very greatly improved. One sample treated almost three months ago and kept in a sterile corked bottle at room temperature is still not clotted, while samples kept at warm temperature—68 to 70 degrees Fahrenheit—did not go bad for over ninety-six hours, and even then were not clotted.'

"It was further established, as a result of the experiments, that the nutritive properties of the milk had not been in any way affected by the electrical treatment, nor was the taste of the milk in any way altered. This is in marked contrast to the result of sterilization by heat, which is apt to produce undesirable chemical changes.

"Dr. Beattie tested the effect of the electrical system on tubercular milk, and although further experiments in this direction are at present in progress, declares that already there is undoubted evidence that even the tubercle bacillus can be destroyed by this method. Two series of experiments with tuberculous milk have just been completed. Reporting on these, Dr. Beattie observes that the number of bacilli inoculated into the milk was far in excess of the numbers which are usually found in any sample of tuberculous milk. The tests have proved that the tubercle bacillus can be with certainty destroyed in any sample of milk which has been sterilized by this process.

"The report of the city bacteriologist has been submitted to the Infant Life Preservation Committee, who are so satisfied with the result of the experiments that they contemplate installing an electrical sterilization plant at their depôt for the electrical sterilization of all milk sold by the corporation. In due course the report will come before the notice of the city council. Meanwhile we are indebted to the *Liverpool Daily Post* for the facts given above."

The Medical Officer, July 12, 1913.

The German Birth-Rate.

An article on the falling birth-rate in Germany which appeared in the *Zeitschrift fur Medizinalbeamte*, 26 February, 1913, presents some interesting points which are referred to in a review in *Public Health* for June, 1913.

"The author has considered the question of the falling birth-rate in Germany, mainly in relation to a district of 102,000 inhabitants, with which he is officially connected. He finds a very definite decline from 36.9 births per 1,000 of population in 1885 to 26 in 1911.

"As reasons for this decline he lays stress on the increased cost of living and of rearing children; the increase in female labour; the prevalence of a Malthusian spirit; the excessive anxiety both of the laity and of the medical profession as to the possible influence of pregnancy on intercurrent disease; the influence of alcohol and of sexual disease; and, fianlly, the widespread adoption of artificial means of preventing or of terminating pregnancy.

"As preventive measures he suggests (*a*) that the sale of drugs for producing abortion should be made illegal; (*b*) that the sale of preparations for preventing conception should be limited to pharmaceutical chemists, and then only when a medical certificate is presented; (*c*) that such supervision of housing conditions shall be exerted as shall prevent large families from being handicapped in their attempts to get house accommodation; (*d*) measures against alcoholism and sexual disease; (*e*) a tax on childless couples and on small families, with due regard to the duration of married life, the proceeds to be paid to the support of those who have large families."

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ORGANIZATION, POWERS, AND DUTIES OF THE UNITED STATES PUBLIC HEALTH SERVICE TODAY.

John F. Anderson,
Director of the Hygienic Laboratory of the United States Public Health Service·

Read before the Massachusetts Association of Boards of Health, July 31, 1913.

The Federal Public Health Service is a bureau of the Treasury Department. Beginning as the Marine Hospital Service, through successive acts of Congress it has undergone a process of evolution so that all of its duties are essentially of a public health character, and it is organized with a view to their performance.

The central bureau at Washington, which is presided over by the surgeon-general, has seven divisions, as follows:

1. Personnel and accounts.
2. Foreign and insular quarantine and immigration.
3. Domestic (interstate) quarantine and sanitation.
4. Sanitary reports and statistics.
5. Scientific research.
6. Marine hospitals and relief.
7. Miscellaneous.

Each of the six divisions first mentioned is in charge of an assistant surgeon-general, who is directly responsible for administrative matters in connection with his division. In the absence of the surgeon-general the officer next in rank acts in his stead. This is the officer who has charge of the Division of Personnel and Accounts, and who has immediate supervision of the entire personnel and appropriations, and the preparation of the annual estimates therefor.

Through the Division of Foreign and Insular Quarantine and Immigration are administered all matters relating to maritime quarantine and medical inspections of aliens. In the field this division is represented by forty-four quarantine and inspection stations scattered along the several coasts in the continental United States, twenty-five insular stations, and thirty-seven stations located at foreign ports, and eighty-three immigration stations.

Through the Division of Interstate Quarantine are administered all matters relating to the control of contagious and infectious diseases in interstate traffic. In the field this division is represented by officers engaged in the inspection of Government buildings, suppression of plague outbreaks, and control of epidemics of typhoid fever and other diseases in coöperation with state and local authorities.

The Division of Sanitary Reports and Statistics handles all matters relating to the collection of morbidity reports, reports of epidemics, and of information pertaining to the geographic distribution of disease and to climate in relation to health and disease. It prepares and publishes the weekly Public Health Reports and reprints therefrom.

In the field it is represented by officers of the service wherever stationed, and through the Department of State by American consuls at foreign ports. In the United States it depends largely on the voluntary coöperation of state and municipal authorities to furnish information and forward reports of sanitary conditions within their respective jurisdictions.

The Division of Scientific Research administers all matters relating to investigations of contagious and infectious diseases and matters pertaining to the public health wherever made. In the field it is represented by the Hygienic Laboratory with its four divisions, the plague laboratory in San Francisco, the leprosy investigation station in Hawaii, the pellagra investigation station at Savannah, Ga., the station at Wilmington, N. C., for the investigation of the parasites of man, and by officers engaged in investigations of typhoid fever, Rocky Mountain spotted fever, poliomyelitis, etc., in different parts of the country, and sanitary surveys of navigable waters wherever conducted.

In the Division of Marine Hospitals and Relief are administered all matters connected with the care and treatment of seamen and recruiting for the several bureaus of the department. In the field it is represented by twenty-two marine hospitals and one hundred twenty-one relief stations.

In the Miscellaneous Division are handled all matters in relation to the care and distribution of publications, and to the examinations of surfmen of the Life Saving Service, and to claims for disability in that service.

Today the Public Health Service has a corps of approximately 450 medical officers, 50 pharmacists, and a total personnel of about 2,000.

Advisory Conferences on Administrative Matters.

Under the Constitution and existing statutes, the Federal Public Health Service is restrained from assuming duties that properly devolve upon state and municipal authorities. But their relations are so intimate that Congress has made provision not only for coöperation, but for conferences on public health matters. In the public health law of July 1, 1902, provision is made for annual conferences between the Public Health Service and state boards and departments of health. Provision is also made for special conferences with all or a part of the state health organizations, and upon the application of not less than five state health authorities, a special conference must be called. The deliberations pertain particularly to administrative measures. In effect, there is thus provided an advisory council on administrative matters, which in its development will insure coöperation and be an arbiter on vexed sanitary questions, and in which each state is entitled to representation.

Advisory Conferences on Scientific Matters.

In the previously mentioned law Congress also provided for an advisory board for consultation relative to investigations to be inaugurated and the methods of making them in the Hygienic Laboratory. This board consists of nine members, four of whom are officers of the Government, the remaining five being scientists eminent in laboratory work and connected with the leading endowed institutions of the country. By this means the service is brought in touch with the great scientific laboratories, and may avail itself of advice from the highest sources.

Congress has thus made provision for councils in respect to both administrative and scientific matters. Their utilization in the highest degree is one of the most important means of development of public-health organization and public-health work.

The foundations have been laid for further development and for the performance of a greater amount of efficient sanitary work. In order that health administration shall be effective, however, it must be adequately supported by appropriations, and it is the securing of these and their wise expenditure that constitute efficient administration.

Federal Health Administration in Relation to Foreign Intercourse.

Federal health administration had for its fundamental object the prevention of the introduction into the United States of pestilential diseases. As long ago as May 27, 1796, a national law authorized the President to direct the revenue officers and revenue cutters to aid in the execution of quarantine, and also in the execution of the health laws of the states. As a further means of aiding foreign commerce, provisions were made in successive navigation laws to promote the health and comfort of passengers at sea, and in 1798, provision was also made for the care and treatment of persons employed in the merchant marine.

Foreign and Insular Quarantine.

The necessity for more and more extensive Federal supervision over international traffic was made apparent by repeated epidemics. The first permanent quarantine law, passed April 29, 1878, was a result of the widespread and severe epidemic of yellow fever during the previous year. The passage of the law of February 15, 1893, was intimately associated with the outbreak of cholera in Europe in 1892, and the quarantine act of June 19, 1906, followed the epidemic of yellow fever in the Southern States in 1905. Under the above-mentioned laws and a few minor ones, there was finally developed the national system of quarantine as it exists today—a system, the development of which occupied approximately 100 years.

All quarantine operations in the United States are conducted under the supervision of the Federal Government, and, with two or three exceptions, all stations are conducted by Federal officers.

SANITARY SUPERVISION OF IMMIGRATION.

A long series of immigration laws have been enacted between the periods March 20, 1819, and February 20, 1907, their general objects from a hygienic standpoint being the improvement of the health and comfort of arriving aliens, and the development of a stronger race in the United States.

On arrival at domestic ports, all aliens are required to undergo medical inspection, and for those suffering with disease, hopsitals are maintained. The object of the medical supervision of immigration is to exclude the physically and mentally unfit, and especially the latter, who will endow their offspring with an unstable mentality, thereby bringing about the further increase of insanity in the United States. This medical inspection is conducted by the Public Health Service.

FEDERAL HEALTH ADMINISTRATION IN RELATION TO INTERSTATE INTERCOURSE.

The administrative procedures in international sanitation having been established, and their further improvement assured, the great public health problems of the Nation are now of an interstate and intrastate character.

The Federal public health statutes are based upon, or are carefully in accord with that clause of the Constitution which gives the right to Congress to regulate commerce between the states. On account of the far-reaching effect of interstate intercourse on our national life, the field for public health activities on the part of the Federal Government is wide. But it must not be occupied in such manner as to usurp the power of the states or impair the efficiency of state and local public health authorities.

The first Federal statute relating to the public health provided that there should be coöperation between Federal and local authorities, and this principle has been recognized in all subsequent legislation and followed in its enforcement.

QUARANTINE AND SANITATION.

Under the quarantine act of February 15, 1893, the secretary is authorized to issue regulations for the prevention of the spread of infectious and contagious diseases from one state to another, where the regulations of the states are inadequate. These regulations may be enforced by state and local authorities, but the Federal Public Health Service is authorized to coöperate in their enforcement, and should the states fail or refuse, the President may adopt such measures as in his judgment shall be necessary.

The powers under the above-mentioned statutes are broad, and the extent of their enforcement by the Federal Government depends on the facilities provided, the necessities in each case, and the state of public opinion in respect to the advantages of sanitation. Examples of work of this character that may be mentioned are coöperative measures for the collection and examination of rodents to prevent plague; anti-typhoid campaigns in urban and rural districts, and sanitary surveys of interstate and international waters in relation to the prevention of the spread of typhoid fever.

There is necessity not only of quarantine measures to prevent the spread of communicable diseases, but sanitary measures to prevent their propagation. These include the sanitation of trains and vessels and the supplies used aboard, the regulation of conditions under which the employees of common carriers work, and the exclusion of dangerous or infected merchandise from transportation.

The Control of Epidemics.

On account of the relation of epidemics to the hygienic and commercial welfare of the country, the Federal Public Health Service may, under the provisions of the above mentioned law, assume responsibilities in respect to their control under the direction of the Secretary of the Treasury and the President. In the event of outbreaks of cholera, yellow fever, smallpox, plague, or typhus fever in any part of the United States, the President is also authorized to cause regulations to be issued and enforced to prevent their spread, and an epidemic fund of approximately half a million dollars is appropriated annually for expenditures of the Federal Public Health Service in suppressing epidemics of these diseases.

It is under such authority that the epidemics of yellow fever in the Southern States, the outbreaks of plague in California and our island possessions, and similar outbreaks have been handled. In every instance, however, there has been thorough coöperation on the part of the Federal, state and local authorities. The equity of our form of Government requires that the two latter shall exercise their police powers to the fullest extent, and it is on request of these authorities that the Federal Government goes to their assistance. This may be advisory in character, or may assume a more active form.

When material aid is extended, the Government's funds are required to be expended by officers of the Federal Public Health Service, and these latter are, therefore, placed in charge, and have the coöperation of state and local officials as well as officers of the Federal Government.

The occurrence of epidemics affords opportunity for investigations of an epidemiologic and research character, and advantage is taken of such situations. As an example may be mentioned the studies of plague in California and typhus fever in Mexico City, of yellow fever, of dengue, and a number of others.

CONTROL OF BIOLOGIC PRODUCTS IN INTERSTATE TRAFFIC.

The dangers to the public health from the exploitation of contaminated or inert biologic products impelled Congress to pass the act of July 1, 1902, regulating the propagation and sale in interstate traffic of viruses, serums, toxins and analogous products. By its provisions, licenses are issued to establishments to engage in such traffic. Prior to the issue of licenses inspections are made of each establishment by officers of the United States Public Health Service, and examination is made of all products for which license is desired. These examinations are repeated from time to time, samples obtained in the open market being used.

COLLECTION AND COLLATION OF SANITARY INFORMATION.

The successful administration of public health laws depends essentially upon a knowledge of the existence and current prevalence of communicable diseases, the conditions that favor their propagation and spread, and the measures that are required for their control.

Information is received by the Federal Public Health Service from American consuls throughout the world regarding dangerous diseases that exist or are epidemic in foreign ports.

Of even greater importance to the health of the country are the collection and collation of sanitary information and reports regarding the prevalence of diseases and the occurence of epidemics within the states. This work on the part of the Federal Government is carried on with the voluntary coöperation of state and local authorities.

Sanitary information and reports of the occurrence and prevalence of disease are collected and published by the United States Public Health Service.

The extent to which notification of cases of sickness can be carried out depends upon the facilities provided the Federal Public Health Service and, primarily, upon the development of local health organization within the respective states. The difficulties encountered in the enforcement of the notification of cases of disease in the United States are not unlike those encountered by sanitary authorities abroad, but in overcoming them there will be performed one of the most important duties in connection with the preservation of the public health.

DISSEMINATION OF INFORMATION RELATING TO THE PUBLIC HEALTH.

Sanitary reports and statistics and the results of scientific investigations are of value only as they are made public and used. An important administrative measure, therefore, is the distribution of public health literature and the presentation of the public health lectures and exhibits. By these means the Federal Public Health Service has been able to disseminate a considerable amount of sanitary information and participate in the educational propaganda.

Among the publications issued are the Hygienic Laboratory bulletins, bulletins of the Yellow Fever institute, Public Health bulletins, the weekly Public Health reports, and miscellaneous documents. The Hygienic Laboratory bulletins represent the results of scientific investigations conducted in the laboratory. The Public Health bulletins are popular in character, and are utilized to convey sanitary information to health officials and to the public generally. The weekly Public Health reports are issued primarily for the benefit of health authorities as an aid in administration. Their utility is recognized throughout the world, and their improvement as contemplated will render them the most useful organs in health administration in this country.

The Public Health bulletins are to be further popularized and made of interest to individuals, and they should be distributed by millions.

INVESTIGATIONS OF MATTERS PERTAINING TO THE PUBLIC HEALTH.

Another important function of the Public Health Service in relation to the public health, and perhaps the most important one, is the conduct of scientific investigations. By this means Federal administration in public health matters is simplified and rendered more accurate; local authorities are likewise aided, and through them the people are benefited by being taught the degree of sanitary excellence that may be attained.

By an act of March 3, 1901, investigations of contagious and infectious diseases and matters pertaining to the public health were given definite status in law. Provision was made whereby laboratory investigations would be systematically carried on. Through this provision and in connection with the enforcement of the quarantine laws investigations have been made in Washington and different parts of the country. In order to comply with the law, however, this work was carried on largely through the Hygienic Laboratory.

By an act of Congress approved August 14, 1912, broader powers were conferred on the Public Health Service to "study and investigate the diseases of man and conditions influencing the propagation and spread thereof, including sanitation and sewage and the pollution, either directly or indirectly, of the navigable streams and lakes of the United States."

There is thus abundant authority for both laboratory and field investigations by the Public Health Service. As in the past the investigations will be conducted by officers specially trained and with such coöperation as state and local health authorities may be able to render. But in order that the great needs of the country may be met, more men and more money must be provided and the Public Health Service must have the active support of individuals, professional associations, and other organizations to be benefited.

Congress has shown a beginning appreciation of the need for more men and more money, by a liberal appropriation to be used for investigations of the diseases of man and the conditions influencing their propagation and spread, and the pollution of the navigable waters of the United States. Increased appropriations were also made for the work of the Hygienic Laboratory and an additional building authorized.

Many highly important problems await solution. Among them may be mentioned the standardization of biologic and other therapeutic products, the determination of the conditions causing pellagra and certain other diseases, the extent of the migrations of tuberculous and other patients from one locality to another, the ascertainment of the influence of artificial illuminants on health, the determination of the relation of housing and other conditions to labor efficiency, and the prescribing of reasonable standards to control stream pollution.

Requests are received daily from all parts of the country for information regarding sanitary problems and methods of handling them. These requests are an excellent indication of the amount and extent of work to be performed in the immediate future. In one section of the country the question of the pollution of streams is pressing for solution; in another, it may be industrial accidents and poisoning; in another, the question of the reduction of infant morbidity; and in still another, the measures that must be taken to eradicate malaria and other communicable disease. Federal health administration involves a wise selection of the problems to be investigated and the securing of appropriations necessary to carry them on.

To summarize briefly: The natural lines of development of the Public Health Service may well be, first, in the increase of its activities in regard to vital statistics, mortality and morbidity; second, in a great extension of its field of research, especially with a view of establishing minimum sanitary standards of every description; third, in enlarging the extent of its coöperation with state and local boards of health; and, fourth, in greatly increasing its powers of diffusing knowledge.

All will agree, I am sure, that the development of the Public Health Service in such directions portends a future rich in possibilities for public health achievement, and that all who have the health interests of the country at heart should join forces in trying to bring those things to pass.

Discussion.

Professor W. T. Sedgwick: I cannot let this opportunity go by without saying a word for the splendid service with which Doctor Anderson is connected and which he so honorably represents. It so happens that I know a good deal about it, and I have been struck with the wonderful organization and efficiency which the national, that is, the Federal public health service now has. In 1880 or 1881, or thereabouts, we had a national board of health for two or three years. It did good work. It was composed of excellent men. But the time was not ripe for it, and, before we knew it, it went out of existence. Then out of the Federal Marine Hospital Service, as has been stated so concisely and accurately by Doctor Anderson, has grown up what we call today the United States Public Health Service, and I have been surprised to see how ignorant people are about this. People are going even today up to the President of the United States and saying, "We want a national board of health, we want a national bureau of health, or something of that kind." Why, gentlemen, we have already got it. We have got a splendid national health organization, described by this very paper which Doctor Anderson has read to us. It is true it has still some technical terminology; it has a surgeon-general, and the officers are called surgeons and passed assistant surgeons, and all that sort of thing. But there is mighty little surgery in it today. It is good straight public health work. I am sorry that those terms are still attached to it, but they are, and they don't hurt the men who are doing the work a bit, and they don't hurt the public that is getting the work done. We ought, instead of going and pleading for a national bureau of health, as some people are doing today, to strengthen the arm of this service which is already on deck, which has got an appropriation of $200,000 to investigate streams and all sorts of things—interstate streams—and to do good, straight, sanitary work. I was very eager to have a representative of that service, primarily of course, Doctor Blue,—the head of it, the distinguished investigator, you remember, of the plague on the Pacific Coast, the man who did more than anybody else I suppose to keep the plague from running over this country,—to have him come and have you all see and hear him today; but he had to go to the Pacific Coast, and so he delegated Doctor Anderson, the chief of that wonderful laboratory which belongs to the service, to come and talk to us. We had to cut him down to twenty minutes, and so his paper has been too concise. But I just want every member of the Association to feel, as I do, that we have got now in the United States a national board of health, or what amounts to that—a United States Public Health Service. It is ready to come, whenever invited, to help investigate epidemics, to help test the quality of biologic products, toxines and vaccines and serums and the like, and to lend a hand to the states and to the cities whenever they want help. It is a splendid step forward, and something of which we ought to be very proud. I feel that we ought to apologize to Doctor Anderson for cutting him down in time, and I could not help getting up and saying what I feel in regard to this Service, that it is an honor to the United States of America today and compares favorably with the national health service of any country on the face of the globe.

A RECENT CONTRIBUTION OF THE FEDERAL GOVERNMENT TO PREVENTIVE MEDICINE AND HEALTH CONSERVATION.

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Read before the General Sessions, American Public Health Association, Colorado Springs, September, 1913, and before the Massachusetts Association of Boards of Health, July 31, 1913.

The United States Government, through the Bureau of Labor Statistics of the newly created Federal Department of Labor, aims to discover the true death hazard of wage earners, by age groups, sex and race, within the several occupations, and hopes to disseminate that knowledge widely among the people, together with information concerning other phenomena and accompanying circumstances of living that plausibly may explain interruption of life within age periods normally, of greatest economic efficiency. Such an educative campaign as that of which this Vol. XIV of the 19 volume U. S. Senate Document No 645, 61st Congress is the first concrete illustration, and cotton manufacturing, the industry initially thus studied, would seem to form no unimportant part, therefore, in the modern crusade to conserve health, and to be an essential prerequisite to the success of Preventive Medicine.

Especially noteworthy, perhaps, among incidental results accomplished through this inquiry are the following:

1. Recognition and thorough demonstration of the inherent and practical superiority of the death rate or induction method which (except for three descriptive pages inserted chiefly as an illustration of the usual or inspection method), is employed exclusively throughout this work; is the

II. Recognition that practically for any study into anti-longevity causes, age group 15 to 44 alone is amply representative of an industry's health characteristics, and overwhelmingly so as regards such industries as largely employ females. For since it is shown that regularly only about one third of the aggregate deaths of individuals aged 10 years and over (and hence potentially of working age), fall within age group 15 to 44, a practical application of this sufficiency of age group 15 to 44 for any ordinary investigation into conditions affecting longevity, obviously may save in future similar studies, two thirds of the labor which the present work required.

III. Recognition of the principle that fundamentally the desirableness of any of the phenomena or accompaniments of living each is measuraable, and, therefore, interrelatively comparable, only through time units, *i.e.*, only through its anti-longevity effect;

IV. Recognition of the principle that however unequally noxiousness may have been apportioned among the various factors or forces contributory to death, still the aggregate forces which ended, for example after 30 years, the life of any specified individual, must always equal the aggregate forces which ended at the same age of 30 years the life of any and every other individual. Thence through simple algebraic processes of elimination of common factors, etc., suggestive and instructive equations ultimately may be developed, especially when the contributory factors in many thousand lives ended similarly at the age of 30, shall be available likewise for comparison.

A small table, on page 153, of the volume, illustrates how practical and plausible are the tentative inductions that logically may be drawn even now through a modified application of these just-mentioned principles.

OBJECT.

The primary object of this study specifically, however, was to secure essentially accurate age group death rates for the great cotton manufacturing industry. In pursuit of this primary object the investigation disclosed the fact that in the country's largest cotton manufacturing city not even one half of the females who had died two years or less after quitting cotton-mill work were recorded upon the official death certificate as having been cotton operatives.

At the present time, therefore, even in the registration states which are reputed to gather their vital statistics most carefully, the official death records fail to indicate even approximately how many woman cotton operatives die each year, although cotton manufacturing is the foremost industry of the chief of these states and half the workers in it are women. That knowledge of the true mortality statistics of an occupation is an absolute prerequisite to an intelligent formulation of adequate remedial measures seems obvious.

A second and very practical purpose was to point out the true underlying or basic factors or agencies to which the debility or impaired health, which must usually precede death, may reasonably be ascribed.

From the practical standpoint, interest would seem to attach far less to the officially designated causes of death—the so-called diseases—than to the debilitating factors of which the disease may be only the final manifestation. For early recognition of such debilitating and disease-producing factors may render it possible either to remove them or make them harmless by increasing the physical resistance of the prospective victim, who, knowing his danger, may take suitable means to avoid it. Prophylactic or disease-preventing efforts are infinitely more useful than curative ones. But for the prevention of debility, disease, and premature death, knowledge of their basic causes is obviously an essential prerequisite.

BASIS OF INQUIRY.

The study is based upon transcripts of the official death certificates, furnished in Massachusetts by the Secretary of State, and elsewhere by secretaries of the respective State Boards of Health.

Excepting solely as regards "occupation" and as respects such decedents as had died immediately after parturition, the original data of the official certificate invariably have been used in this initial analysis of anti-longevity causes without any change whatever.

And this, too, despite the fact that in a number of cases in which the physician's certificate gave some such equivocal cause of death, as bronchitis or hemorrhage, or some terminal condition, such as broncho-pneumonia or heart failure or debility, the history of the case when studied showed almost beyond question that tuberculosis had been the real cause.

METHOD OF SECURING DATA.

To attain these two objects—the correct mortality by age groups in the cotton manufacturing industry and a knowledge of the underlying debilitating factors which might explain this mortality—a personal inquiry was undertaken concerning each individual, aged 10 years or over, who within a three-year period had died from specified diseases or causes within specified cotton manufacturing cities. This inquiry was made at the late home of the decedent and nearly always from a relative, who furnished information also as to the decedent's family, his habits, occupational and conjugal experiences, exposure to communicable disease and other personal facts of possible significance in explanation of his death. Moreover, the investigator personally inspected the premises and made note of certain hygienic conditions which might have been numbered among the debilitating factors which led up to the death.

RELIABILITY OF INFORMATION SECURED.

Owing to the fact that tuberculous operatives showed a tendency to return to their early homes when they were no longer able to work, it is probable that for all the cities studied the number of operative decedents is slightly understated. It is quite certain that there is no overstatement of the number, because no decedent has been classed as an operative unless a definite statement to this effect was made by an informant whose name is on record. The statement on which the occupation classification is based included not only the fact that the decedent had been a cotton operative, but also the name of the mill in which he had been employed, usually, also, the specific occupation at which he had worked, and always the fact that he had been employed at such mill work within a specified period, not exceeding two years, before his death.

It is obvious that evidence so specific and detailed would not probably be manufactured, especially as the informant had no inducement to misrepresent the facts in either direction. During the course of the investigation an incidental proof was obtained of the general accuracy of the information gained. The inquiry was begun in Fall River. Five months after its data had been secured a change in the scope of the investigation made it necessary to record certain additional data concerning female decedents, which could only be obtained by revisiting the earlier informants. In this reinvestigation, several hundred persons were questioned a second time on points on which they had first given information five months earlier, yet in only two cases was their testimony found to differ from the original statement in any important particular.

"Operative" Defined.

The term "cotton operatives" is used to mean only those persons whose work had been such as to expose them many hours daily to the processes or hygienic conditions peculiar to a mill that manufactures cotton wadding, yarn, thread or cloth. The term has been still further restricted by limiting it to those who were either working in a cotton mill up to the time of death, or who had left it not more than two years before death. This arbitrary limit was fixed upon after consultation with eminent medical men as being probably well within the period during which the effects of mill influences, even if latent while the decedent was in the mill, might yet be considered beyond question as having borne a causative relation to his death. In the course of this study many facts were elicited showing resemblances, sometimes almost to identity, between the class just outside the two-year limit and the operative class. It was felt that this fact gave a strong indication that the two-year old limit erred, if at all, on the side of conservatism, and that possibly a limit of three or even four years, or the inclusion of nearly lifelong cotton-mill workers retired through age, would have been fairer.

Comparative Study of Selected Groups and Classes.

"The age period, 15 to 44 years, was selected for special intensive study because it represents a period of full industrial activity during which the death rate would normally be low.

"A second reason for choosing this age period for special study lies in the fact that more than one-half the entire population is found within its limits, so that it presents a wider field for study than a more limited age group could do. Moreover, for a study of causes of death among cotton operatives, this group presents unique advantages, since more than four fifths (85 per cent.) of the entire operative population is included within it. Also within its limits are found three fourths (76 per cent.) of the entire number of tuberculous deaths of individuals aged 10 years and over, nearly three fourths (73 per cent.) of the whole operative mortality from all causes; and fully nine tenths (91 per cent.) of the entire operative deaths from tuberculosis."

Evidently any specified cause or disease is important just in proportion as it is active among the country's producers and its reproducers—its workers and its child bearers. And since the child bearers are almost wholly, and the workers very largely, found within the age group 15 to 44, the different causes of death challenge attention and call for remedial action in proportion to the share of their victims they draw from this group. Hence the question of foremost importance to be answered concerning a specified disease or cause of death is not: "How many deaths are ascribable to it? " but, rather, "Are most of its deaths within age limits that embrace the bulk of the productive population?"

So, finally, tuberculosis was selected for intensive study because it was found to be the most prevalent ultimate or immediate cause of death within the age period 15 to 44, which comprised one half the total population and four fifths of the operative population of the cities selected for study.

METHOD OF ESTIMATING SIGNIFICANCE OF CONTRIBUTORY CAUSES OF DEATH.

There are certain circumstances or experiences, common but not inevitable accompaniments of living, which may be active factors in the causation of both disease and death. Such, for instance, are (1) bad heredity; (2) ignorance; (3) bad air, whether germ laden, dusty, humid, or chemically impure; (4) bad food, that is, ill chosen, ill cooked, or ill chewed; (5) bad or alcoholic drink; (6) bad personal, sexual, or apartment hygiene; (7) long labor and short sleep; (8) occupational stress (hurry and worry); (9) scant income, whether through thriftlessness, misfortune, or low wages; (10) accompaniments of the conjugal condition, such as childbirth and dependents; (11) overwork or non-resiliency from fatigue. These or some of these conditions might be encountered in the life history of any decedent, and it has been assumed tentatively that the significance of any such condition as a causative factor of death is established by the frequency with which it was found to have occurred as an antecedent of the deaths studied.

For example, the following study shows that in Fall River 29 per cent. of the decedent female cotton operatives had had tuberculous relatives, while only 21 per cent. of the decedent male operatives had had similarly affected relatives. In accordance with the above principle it has, therefore, been tentatively assumed that tuberculous kindred have more influence as a causative factor of deaths among female than among male operatives.

Again, the economic importance of any factor or group of factors is measured fundamentally by its longevity effect; *i.e.*, its effect on the duration of life. In this study it has been tentatively assumed that this effect is shown by the rare occurrence of a given factor in the life history of young decedents, or conversely by its frequent occurrence in the life history of those who attained a high average age before death.

For instance, it was found that in one of the cities, during the three years covered by this study, four fifths (79 per cent.) of the total number of deaths from tuberculosis among the female population aged 10 years or over occurred in the age period 15 to 44, while of the deaths in the same age and sex group from pneumonia and cancer less than a third of the first and one quarter of the second occurred in the age period 15 to 44.

In other words, tuberculosis had a far more marked anti-longevity effect in this group than either of the other diseases. But this period is that of the greatest industrial importance. It is evident, then, that so far as this section of the population is concerned, tuberculosis, which finds its greatest number of victims in the period of chief industrial activity, is economically far more important than pneumonia and cancer, which find their victims principally among those whose industrial effectiveness is either waning or practically at an end.

Basically each life experience is bad in proportion to the extent that it shortens life. It is only, therefore, by a comparison of the ages at death of individuals whose lives were characterized by specified experiences that the relative effectiveness of these experiences in ending life can be determined.

This method of reaching conclusions as to the physical condition of a specified class of individuals by a comparison of accurate death rates has been so seldom mused and differs so radically from the customary method that the main points of variance between the two modes of investigation need some consideration.

ADVANTAGES OF THE DEATH RATE OVER THE INSPECTION METHOD.

First of all, these two methods differ widely in the sharpness with which their basic terms may be defined. For the term death has a precise significance and is unqualifiable; whereas the term debility, ill health, or disease is inexact and qualifiable. Moreover, the unit of the one measure, death, is a demonstrable fact, while the unit of the other, ill health, may not be susceptible of demonstration. The one is absolute, the other only relative. And finally death is fixed and unchangeable, whereas ill health is variable.

Secondly, the death-rate method has a great advantage over the inspection method in the possibility it offers of isolating a given life experience—as, for example, cotton-mill working or tuberculous infection, from other life experiences or circumstances, and for determining its relative probable power for harm, or anti-longevity effect. For this purpose the unit of the death-rate method—an individual dead—is worth immensely more than is the unit of the inspection method—an individual debilitated, ill, or diseased.

For when it is said that a given number of individuals at a certain age are in ill health or diseased, it is impossible to say how much injury any one of them has suffered or will suffer from the ill health or disease by which he is affected. His physical condition is the result of a number of factors acting in combination. It might conceivably be possible to learn every one of these factors, but as there is no way of measuring definitely the amount of harm they have accomplished in combination, there is evidently no way of determining the amount of harm for which each is responsible. Together they have brought about a general condition known as ill health, or perhaps some specific condition such as tuberculosis or typhoid fever, but the inspection method affords no way of learning what either the general or specific condition means in years of life sacrificed or industrial efficiency lost.

But when it is stated that a given number of individuals of a designated age have died, it is evident that each one of them has suffered the greatest total physical injury to which any individual of that age is susceptible. The factors which have produced death at the specified age undoubtedly differ widely from case to case in number, in identity, and in individual harmfulness, but in every case their combined effect has been the same—death within a specified age period. Knowing, therefore, their combined effect, it becomes possible to determine with some degree of accuracy the relative degree of harmfulness of each factor.

Another very marked advantage of the death rate method as used in this study is the opportunity it offers for comparison between occupational groups, or between those in one occupational group and the general population. Thus, in the present case, concurrently with the investigation into the underlying causes of death among cotton operatives, a corresponding investigation was conducted into causes of death among the non-operative decedents within the same age period. To show the value of such comparative statistics in investigating health and longevity problems, let it be supposed that the data so collected show two groups of married female decedents of essentially equal physical and mental hereditary endowments and of essentially similar life experiences, except that those of one group were engaged in cotton-mill work for the fifteen years next but two preceding death, while those of the second group were engaged in housework at home for the same period. Let it be further supposed that each of these decedents had been exposed to tuberculous infection through a consumptive member of her family, and that all died of tuberculosis, the cotton-working group at the average age of 30, the home-staying group at the average age of 40 years. These contrasting occupational groups might then be said to constitute a vital experiment—infection—performed under conditions, *i.e.*, vital experiences, seeming to differ in but one material circumstance, the conditions of work. The difference of ten years in length of life might logically, therefore, be attributed to that one circumstance.

An added advantage of the death-rate method is that it has to do the more with malign influences. For as psycologists, alienists and criminalogists through study of the grossly abnormal in child and adult are discovering the basic laws of mind; and as anatomists and pathologists through dissection and microscopic examination of the cadaver are discovering the basic laws of surgery and remedial medicine; so analogously, students of prophylactic or preventive medicine should find analysis of life experiences and circumstances of the dead, rather than of the sick, the more prolific in conclusive results or disclosures concerning the basic laws of health.

The possibilities of logical inductions (or colloquially, of common sense reasoning) surely to follow from use of the unit of the death rate method in securing the isolation of a suspected anti-longevity factor and in the subsequent rough measuring of that factor's destructiveness to life, as well also as in comparing its own malignity with that of other anti-longevity forces, have been demonstrated in the following small "key-note" table on page 862.

A comparison of the average age at death of the three classes included in this table shows that among female decedents in Fall River who had been mothers, tuberculous operatives died at the earliest age. These also had borne the smallest number of children per decedent mother, and showed the largest percentage of deaths among these children.

Next in average age at death came the non-tuberculous operatives. These showed a moderate degree of child bearing and a moderate mortality among the children produced.

Finally came the tuberculous non-operatives. These showed a moderate degree of child bearing and the smallest percentage of deaths among the children.

INDUCTIONS.

The fact that it averaged eleven years less time for the factors in Class I, than for those in Class III, to produce a bodily state fatally vulnerable to tuberculosis, points to cotton-mill employment rather than to prolificacy as having been by far the more important causative factor in the death of married Fall River females in 1905 to 1907.

Likewise, Classes II and III would seem to indicate that cotton-mill employment unhandicapped with tuberculosis was basically a weightier factor in fatally terminating motherhood than was absence of operative work even complicated with tuberculosis.

Moreover, the fact that it required eight years less time for the factors in Class I than for those in Class II to effect a fatal result emphasizes how great a life-shortening factor tuberculosis is and what social and economic loss it occasions.

However few the children, therefore, motherhood conjoined to cotton-mill work in Fall River constituted a combination of duties that was prejudicial to child life; and conversely for Fall River female decedent operatives of 1905 and 1907, any extra work outside the mill including the care of children, however few, constituted a seemingly debilitating influence that in the average case, even in the absence of tuberculous infection, was inimical to maternal longevity.

COMPARATIVE FREQUENCY OF INCIDENCE OF DESIGNATED FACTORS AMONG SPECIFIED CLASSES OF FEMALE MARRIED DECEDENTS IN FALL RIVER DURING 1905 TO 1907, TOGETHER WITH THE RELATIVE LONGEVITY OF SAID CLASSES,

Age group 10 years and over.	Specified debilitating factors.					Casualty and infection.	Average longevity effect.
	Work.	Average prolificacy.	Average percentage of children dead.	Miscellaneous factors.	Resultant effect.		
Class I.—Tuberculous operatives (55).	Exclusively industrial.	Minimum.	Maximum.	(?)	Profound debility.	Tuberculous.	Death very early (age 30); brief illness.
Class II.—Aggregate non-tuberculous operatives (118).	do	Next to minimum.	Next to minimum.	(?)	do	Minimal	Death less early (age 38); illness briefest.
Class III.—Aggregate tuberculous non-operatives (66).	Minimally industrial.	Moderate.	Minimum.	(?)	Moderate debility.	Tuberculous.	Death least early (age41); illness longest.

SUMMARY OF SPECIFIC RESULTS.

These are some of the salient points brought out in the study, as disclosed by the report.

I. The effect of cotton operative work upon health, as reflected in the death rate, differs widely between the sexes. For the thirty-year age period from 15 to 44, in which the great majority of the operatives are found, the death rates of males and females in the general population are almost identical, the male rate being 6.19 and the female rate 6.18. A comparison of the death rates of male and female non-operatives shows the rate for males to be 22 per cent. in excess of that for females (male rate, 6.48; female rate, 5.31). When, however, the comparison is confined to the death rates of operatives the female rate shows an excess of 33 per cent. over the male (male rate, 5.74; female rate, 7.63) despite the younger ages of the female operatives.

II. For the population aged 15 to 44 as a whole, and for every 5 year age group subdivision except two, the situation as to racial mortality may be thus summarized: Of all the races and peoples, the Americans exhibit considerably the greatest, and the Irish the least, physical resistance to fatal influences, the former having been about one-third less and the latter about two-thirds more liable to die from "all causes" than the general population: the English were about one-quarter less liable to death than were the individuals of all races on the average; and finally the French Canadians exhibit slightly less and the "Other races" slightly more than combative resistance to death than is shown by the average of individuals of all races.

III. In the age groups within which operatives and non-operatives are fairly comparable, female operatives have a decidedly higher death rate than non-operatives. This is most marked in respect to tuberculosis, the death rate of female operatives from this cause being in general more than twice that of non-operatives, and in some of the race and age groups running up to many times as high. Thus, in the age groups 15 to 24 years, 25 to 34 years and 35 to 44 years, the death rates from tuberculosis per 1,000 were, respectively, two and one-fourth times, two and one-half times, and five times, those among women of the same age groups outside the cotton industry. Furthermore, as respects males of the aggregate non-Irish races, comprising about six sevenths of the total male population aged 15 to 44, male cotton operatives were slightly, though constantly, more than were male non-operatives liable to death from "all causes," and they far exceeded non-operatives in death hazard from tuberculosis (in Fall River, three years, and three cities one year, excess 74 per cent., 81 per cent.).

IV. Of great importance is the demonstration that at no age were individuals embraced within this study even moderately free from the liability of death from tuberculosis. For even among the obviously largely non-industrial senile population aged 65 years and over, its prevalence was fully one-half (1.61) what it was in that age group, 30 to 34, within which its ravages were greatest (3.19), and in which industrial activity is commonly supposed to be at or near its zenith.

In short, it was found that even numerically as inadequately reported officially as was characteristic of the years 1905–6–7, tuberculosis was yet the certified cause in age group 15 to 44 of one out of every two operative deaths approximately, and one out of every four deaths of non-operatives of both sexes and all races (per cent. tuberculous in Fall River 1 and 3 years, three cities one year—operatives 46, 44, 45—non-operatives 32, 37, 29).

The showing that intemperance in the use of alcoholic beverages had been a characteristic of those classes of males especially that had had the highest death rate from tuberculosis—viz., of the male non-operative Irish, and of the male operative Irish and non-Irish, and most striking of all, of the employees in the liquor trade—brings together coincidences that logically suggest the induction that habitual over-indulgence in alcoholic beverages is a debilitating factor of great weight in the causation of deaths of males from tuberculosis.

Stress—hurry and worry of work without rest intervals sufficient to assure normal resiliency after fatigue (that is, overwork in industrial establishments)—is with the possible exception of infection, the most important etiological factor noted in deaths of women from tuberculosis.

An examination of other factors which might effect the death rate, especially from tuberculosis, such as native or foreign birth, tuberculous kindred or intimates, overcrowding, sanitary condition of homes, etc., fails to show any such massing of unfortunate conditions among the female operatives as would explain their unvarying higher death rate.

Hence it seems impossible to escape the conclusion that operative work is prejudicial to the health of females, that the combination of operative work with matrimony is especially harmful, and that, while the general hazard of the female operative is greater than that of the non-operative, she is in most danger from tuberculosis.

Whether the harmful effects of operative work are greater than those of other industrial employments, and whether they inhere in cotton textile work as a whole or are due to certain occupations carried on within the mills, are questions for further investigations to answer, and the U. S. Bureau of Labor Statistics is engaged now in one such study. This inquiry, however, has established the fact of the high mortality among female cotton operatives and of their special susceptibility to tuberculosis.

In considering the real significance of these conclusions, weight must be given to the character of the death records on which they are based. This study has clearly established that such records, as at present made out. can not safely be used as the basis of mortality studies without investigation of their accuracy.

REGISTRATION ERRORS.

Very incomplete in every city investigated was found to have been official registration as to the occupation upon death certificates. More than one half (51 per cent.) of the female, and over one quarter (28 per cent.) of the male cotton operative decedents, of Fall River during three years, the inquiry disclosed, had been omitted from official certification as having been cotton-mill workers.

The study furthermore discloses that an astoundingly large percentage of those whose deaths were found to have been due to childbirth either primarily or secondarily, had been officially so recorded as to give no intimation that parturition had been a factor in causing death.

And finally a like disingenuousness or design was found evidenced in regard to erroneous registration of tuberculosis under meaningless or grossly misleading designations which gave no hint that tuberculosis had been a factor in the case.

But, however successfully this pioneer work of the Government has accomplished its avowed purpose, "to gain full information upon such points in the occupational and personal history of every decedent operative as might bear upon his length of life, the immediate cause of his death, and any contributory causes thereof;" and however valuable undoubtedly the specific results of the investigation may be, even though at present they may not all be comparable equitably with the uncorrected death data of industries other than cotton manufacturing, still in the author's opinion they all, nevertheless, in importance and real utility are but secondary, as compared with the *system* this study has developed as a method most likely to bring out basic *incontrovertible facts* regarding health conditions within any specified industry or community, to *identify anti-longevity* causes therein; and to *apportion and measure*, at least roughly, the harmfulness rightly ascribable to each such life-shortening force.

Discussion.

VICE-PRESIDENT W. T. SEDGWICK: The book which is now passing around the room is Doctor Perry's report, and as it was based very largely upon personal investigations of conditions in Massachusetts it seemed proper that we who have so much interest in Massachusetts industries and Massachusetts health should take cognizance of it. It is quite impossible to follow everything from his verbal statement, but copies of the report may be got and studied at leisure. You have heard his main results as he stated them toward the end, one of them being the excessive mortality of women operatives—raising the question whether, after all, this industrial life of ours which puts woman in the mills under unwomanly conditions, as some of us regard them, is beneficial. Racial considerations, too, are important. The more newly arrived races seem the more susceptible to this particular disease, which is perhaps to be expected; but we may hope that, as time goes on, selection and acclimatization may strengthen all races coming to our shores, so that they can endure the somewhat untoward conditions which seem to prevail, perhaps necessarily, in our modern industrial establishments. At least, they prevail today, but whether it is necessary that they should continue to prevail is certainly a question.

DR. KENNEDY: I would like to ask a question of Doctor Perry. First I will state what we have in our minds down in New Bedford. We have a great cotton center, the greatest center for fine cotton manufacturing in the United States. I believe it is second in cotton manufacture in the United States, next to Fall River, either second or third. If there is a lot of tuberculosis in mills, would it not be advisable to ask each manufacturer to employ a physician to go through his mill or mills to detect tuberculosis in its incipiency and begin your education then and there? That is one thing that we have considered in New Bedford, and the only thing we are waiting for is a settlement of the tariff question. When it is settled we are going to agitate that. Now, if that is proper, I would like to know it, and if it is not, put us on the right line. Since I have suggested it in New Bedford we have had pointed out to us a concern which has a lot of tuberculosis. We intend to put people in there, not from the board of health but from a private organization, tell them that there is something wrong and ask them if we cannot go through and find out what is the matter, and point out to them what they should do. Now, we don't propose to put the people out of business. It does not mean that every operative who has tuberculosis in its incipiency shall be put out of a job, but to educate him to look out for himself and to educate his near worker to look out for himself. I would like to ask Doctor Perry if that is right. In New Bedford we have considered infant mortality, and we have a priest, who has talked to his people and told them how to bring up their children, and he has talked to the mothers and the near mothers, and he has provided a fund to let the near mothers loaf for a while, so that the child may be brought into the world. Now, I am convinced that that is a good thing, and what would you suggest to better it, because we never get to the best of it?

DR. PERRY: Any action whatever that shall result in early recognition of tuberculous cases obviously has merit. I can see no reason why an inspection of cotton operatives performed in the mill by competent physicians should not result in the detection of at least some cases of tuberculosis in their incipiency, and thus prove advantageous.

As I have just described, the problem in which the United States Bureau of Labor Statistics has been, and is now, engaged is to furnish the *facts* concerning the real death hazard of wage-earners of specified age. To show, for example, just how much fatal tuberculosis exists among female cotton operatives, aged 15 to 44. After the Federal Government has pointed out the extent to which deaths from tuberculosis are common to cotton operatives, it is entirely logical for health officials of cotton manufacturing cities thus to bestir themselves in devising means to check its ravages. Doubtless there are other industries that, upon similar study, may prove to be even more hazardous as respects tuberculosis than is cotton manufacturing. I hope there are not, but I rather suspect that there are—file and stone cutting, for example, and other occupations in which mineral dust is a factor. As yet cotton manufacturing is the only industry the correct death hazard of which has been established. Therefore, any exact comparison of the mortality of industries is at present impossible.

I shall be much interested to learn just how effective in curbing tuberculosis this suggested scheme of the member from New Bedford proves. It seems emphatically worth trying, even though not every case of tuberculosis among the operatives may be expected surely to be discovered thereby. As many as are recognized, however, so much to the good!

AN EXPERIMENT IN PUBLIC HEALTH ADMINISTRATION.

Earle B. Phelps,
Massachusetts Institute of Technology.

Read before the Massachusetts Association of Boards of Health, July 31, 1913.

The problem of board of health administration in the towns and villages is largely a financial problem. The important matters in city health work, such as the isolation and care of the sick, school hygiene, the milk supply, housing and factories, general cleanliness and the rest are all primarily due to or aggravated by the concentration of population. In the small community the control of these matters is relatively simple. Given a sufficient appropriation and a live health officer, there is nothing to prevent an ideal situation.

But the very factors which make for this fortunate situation bring with them a compensating disadvantage. There is in each such community a little work of each kind to be done; a little milk inspection, a little diagnostic and laboratory work, some plumbing inspection, a few nuisances, etc. Moreover this work, although small in amount, is of so diversified a character that its proper handling requires a certain amount of expertness in the several lines. No one will contend, I believe, that the same person can properly inspect plumbing and also examine suspected diphtheria cultures. Specialization is as necessary here as in the case of the cities, and a group of workers corresponding on a small scale to the organization of a city board seems to be the first essential requisite. The process of subdividing, however, reaches a natural limit in a group of three or four specialists and the cost of even such an organization in the case of a small town is entirely disproportionate to the needs.

It seems a logical solution, therefore, since we cannot further reduce our organization unit, to increase the size of the community unit by coöperation among several towns. This, in fact, is the only apparent solution, short of state or county control; for no one will contend, I hope, that the method prevalent in Massachusetts of entrusting the health work of the town to the inexpert hands of local physicians and business men is any solution at all. No matter with what degree of public spirit, enthusiasm and personal sacrifice such men undertake their duties, their work compares with the work of an efficient organization much as the work of the old volunteers compares with that of a modern fire department.

Let us now consider the details of an experiment in public health administration which has been built about the two principles which I have outlined here—specialization and coöperation.

The Board of Health of Wellesley had for three years previous to last fall employed a trained man, Mr. C. K. Blanchard, to give his whole time to the duties of agent of the Board. In November Mr. Blanchard accepted a position in the New Jersey State Board of Health and thus created the immediate opportunity for putting into effect a program which had been previously mapped out by Professor Sedgwick and some of the officers of the Department of Biology and Public Health of the Massachusetts Institute of Technology. This matter was taken up with the members of the Wellesley Board who were immediately interested and who later appointed the speaker general agent of the Board with power to organize a small administrative unit. This agreement was to run for six months to allow time for the extension of the idea. The funds that had been available for Mr. Blanchard's services were placed at our disposal and it was understood that department or personal funds would be used to make up any deficit.

It was realized at the outset that coöperation would never be brought about by mutual agreement among the towns. The question of the proper division of the expense and of the service would involve the whole project in an endless and fatal discussion. We were after results and we went to each town, explaining the coöperative nature of the undertaking but making a definite individual offer of so much service for so much money. There was necessarily a good deal of bargaining, and we had to meet existing conditions of finance and needs so that our financial arrangements are perhaps not quite equitable and not thoroughly business-like. By April first six communities had accepted this service in whole or in part and later two others came in. The list at present in the order of participation, is Wellesley, Belmont, Framingham, Weston, Needham, Melrose, Winchester, Canton.

In Melrose and Canton only the milk inspection has been placed in our hands and in Winchester we merely do the laboratory examination of the samples collected by the milk inspector. In the remainder of the group we perform all the administrative work of the board of health, except that in some towns the plumbing inspection is not included in our agreement.

Each town makes a definite appropriation for the year's work and enters into a contract with the general agent for stipulated services at a fixed lump sum.

The total appropriation amounts to about $6,300 per annum. The population served is approximately:

For milk inspection, alone,	25,000 additional
For general administration (including milk inspection),	30,000
Total,	55,000

We have thus brought about the first requirement of our program and built up a community unit which is big enough to support our minimum organization.

The organization itself comprises an administrative officer, who acts as agent of the several boards, a chemist and bacteriologist, responsible for the laboratory work, a plumbing and sanitary inspector and the necessary clerical and laboratory assistants. There is also the general agent, responsible for the business relations, and matters of general policy, whose services are given to the organization by the Department of Public Health of the Institute. This is the minimum unit for efficiency. With it we can bring expert treatment to bear upon almost any question which may be raised. It is not, however, the most economical unit. By the employment of assistants at a 60 per cent. increase in cost, the output could be doubled and no efficiency sacrificed.

A central office and laboratory is maintained at Wellesley where the laboratory originally installed by the Wellesley Board has been reëquipped for its broader service. An automobile and a motor cycle, together with the telephone, make rapid communication possible. Definite office hours are maintained in the larger centers either by one of our own staff or by a town official whose duties permit him to act as resident clerk to receive complaints and mail and communicate them to the central office. To conform with the law, the various Boards appoint the members of the staff, as their agent, milk inspector, plumbing inspector, bacteriologist, etc., but the organization pays the salaries and running expenses and the agent is responsible for all results. He reports monthly to the Board in writing with a detailed account of all his work.

Culture stations are located at central points at which supplies of media and diagnostic outfits of forms, etc., and of the various state board supplies (vaccine, antitoxin, etc.) are kept. At certain of these stations also portable incubators are maintained so that throat swabs deposited previous to midnight are reported upon the next morning. Positive diagnoses for diphtheria and typhoid are reported at once by 'phone.

The laboratory with its complete equipment for diagnostic work of all kinds under the supervision of an expert diagnostician and the facilities for prompt reports upon this work comprise one of the most valuable features of the service.

The milk supply of each town is examined chemically and bacteriologically once a month. The results are reported to the dealers promptly and to the Board with the agent's monthly report. In the majority of the towns the results are also given to the press and in all cases the records are on file at the local office and may be inspected by the public. We consider this publicity a most valuable feature in controlling the quality of the milk. With it we believe we can safely do away with arbitrary legal standards. If the facts are placed before the consumer, self-protection forces the dealer to improve or drop out. Instead of trying to evade the law and looking upon the milk inspector as a necessary evil, he now comes to us voluntarily for advice and—what is more important—does what we suggest. We place little reliance upon inspection for we cannot inspect proper behavior into a milkman who has no incentive to behave. We do, however, familiarize ourselves with conditions, especially when the analysis shows them to be bad in order to properly advise the producer. We are working on the theory that the laboratory examination of milk is the primary board of health function. It shows us what we are getting. Inspection of dairies is a duty we owe to the farmer if he desires to profit by such inspection.

It was intimated at the outset that this problem of board of health administration is primarily a financial one. There is nothing new in our work; any one can do it with proper funds. The important and novel feature is to give this expert work to towns at a cost which makes it possible for them to take it up. An important matter, therefore, is the accounting. We are maintaining an up-to-date cost-keeping system and know to a penny what each kind of work costs. Even our auto mileage is charged to the various items of work and at the end of the year the costs will be assessed on our books against each town and a profit and loss balance struck, upon the basis of which the costs for another year can be definitely adjusted and new work taken on. Our purpose has been to render the service at cost with no charge for the department oversight, which Professor Sedgwick has generously provided for. At the same time the organization must be self supporting and should show a comfortable reserve for contingencies.

The work is experimental then in a financial as well as a political sense. After April first, 1914, it will remain for the towns to decide whether or not they wish to continue the arrangement. Whatever may be the outcome of that decision, whether the organization shall be enlarged to take in a wider circle, which it can do with additional economy, or shall complete its work and disband, the experiment will have demonstrated the feasibility of this type of coöperation, the satisfactory nature of the service thus made possible and the remarkably reasonable cost of this sort of expert public health administration.

Discussion.

VICE-PRESIDENT W. T. SEDGWICK: I ought to say that Professor Phelps gives a good deal more credit to me and to our department at the Institute than we deserve. It is he, as the representative of that Department, who has done all this and has made it possible. It has been his persistence, his tact, his far-sightedness, which have initiated and carried on this most interesting experiment. The rest of us have supported him and looked on; that is about all. The truth must be told.

Mr. R. N. Hoyt:* I think there are two sides of this very interesting problem. There is a side which may appeal to the communities that we serve, of bringing to them something from outside, something new, but we are also finding that this is twofold, it is bringing to us a great deal. In each community some particular line of work is more developed than it is in other communities. That gives us a chance to do in that community something experimental, which can be carried to the other towns, and I have found that personally very helpful. In one town we can develop milk inspection to an especially high degree. The experiments which we try in that town are very useful and can be applied in other towns. The line of publicity appeals more to one town than it does to another, and we find that developing that idea in one town, finding what really does appeal to the public, what kind of publicity brings results, we can apply that lesson in other towns. And so in many ways we are finding in this community organization, this organization which comprises several localities, a chance to do experimentation in one town that shall be applied in these other communities.

Prof. C. E. A. Winslow: I should like to say a word about Professor Phelps' paper. I cannot quote Doctor Anderson's words, but he stated, it seems to me, today the whole matter in a very complete way in one sentence when he said that the problem of the health officer, national or local, was to get enough money and then to spend it wisely. That was the effect of one of his sentences; but, of course, it is not altogether an easy thing to do. We have come during the last five years to a period of heart-searching as to the most efficient methods,—particularly of spending money for public health work.

I had an interesting experience just about a year ago in the study of the local health situation in the city of Minneapolis, to take the case of a large city. There the civic bodies became interested in an attempted reform of the health department, and called Doctor Biggs, the chief medical officer of New York City, and myself, to make a scientific management study of the health department. We studied the various activities, the control of communicable disease, facilities for hospitalization, control of the food supply and the milk supply, particularly methods of disinfection and so on, and we arrived at results which were at first very disappointing to the civic bodies, who expected an attack, or an exposure of the inefficiency of the health department. We found, without going into details, these two outstanding things: First, that Minneapolis was appropriating the smallest amount for public health service, something like 15 cents per capita. of any of the large cities in its class, against appropriations of over 50 cents for Boston, New York, Newark, New Orleans, and amounts ranging down to Minneapolis, about 15 cents. We found that the particular lines of health department activity that were most neglected there were the ones that had the most inadequate appropriations, that whereas, for example, New York was spending 5 cents per capita for school inspection Minneapolis was spending about half that amount, that while New York was spending 2 cents for infant mortality work Minneapolis was spending practically nothing for that purpose,—I mean through the official health department, and throughout that the appropriations for the most important public health activities were the ones that were the most inadequate. In the second place, we found that the health department was a department of the city council, that all the employees of the health department were appointed once a year by a committee of the council, that the ordinances were all drafted by the council. At that time they had been working for years under a milk ordinance which provided that all the milk of the city should come from tuberculin-tested cows. That, of course, made any attempt at even a milk-license system impossible, and they could not get that ordinance changed. At the time we were there, there was a serious outbreak of rabies, and a muzzling ordinance was referred to a committee of thirteen aldermen, a month before election. So that our conclusion was that although the health department was inadequate in many respects it was a great deal better than the city deserved, in view of its faulty organization and its inadequate appropriation, and that was a surprise, and threw a good deal of light on the situation to the local people.

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*Administrative Agent of the Cooperative Organization.

With a large city it is possible by proper legislation and proper appropriations and with the right men, to get the work done in splendid fashion, to get results such as have been obtained, for instance, in New York City, where the administration of the local health department is an inspiration to any one who can study it; but in the small town there has always been a more serious difficulty. It has been the difficulty that Professor Phelps has so well stated, that the small town cannot afford to pay for the various kinds of expert advice it needs. This difficulty is being met in different parts of the country in various ways. We have just met it this spring in New York state by a very drastic and far reaching law which abolishes the local board of health entirely, keeping the local health officer and placing him under a district sanitary superintendent, who is in turn under the state department of health. This is not a method which, from what I know of the spirit of Massachusetts, is likely to find favor in this state. It is particularly fortunate, therefore, that you have had worked out here this experiment so full of promise, so in harmony with the spirit of Massachusetts. The small town cannot solve this thing alone, and as I say, I think it unlikely that the town in Massachusetts will care to give up its powers to the state, but it can meet the difficulty by coöperation. It seems to me this idea put in practice in this way is one of the most hopeful things that has ever happened for the cause of local health administration. Ours is a period of experimentation in health organization. That title pleases me particularly. The fundamentals of public health science have been worked out in many lines now, so that they can be applied satisfactorily. We have got to experiment with organization, putting them in practice. You know they define an efficiency engineer as an engineer who is out of a job, and, of course, there is a good deal of danger in all this sort of thing. That is why the good efficiency engineers prefer to call their science scientific management. We need scientific management applied to health department organization. It is a great thing to see that it is coming. It is a great thing to see that the Massachusetts Association is carrying on its good work of leadership in this line.

Dr. J. F. Anderson: I think that this work that Professor Phelps has referred to is really one of the most important things that has been brought out in public health work for a long, long while. The efficiency of public health work after all is a local problem. You have got to have efficient local health officers. Why, take even our vital statistics. We have a bureau of census which collects certain vital statistics, the public health service itself collects and publishes certain morbidity statistics, but after all we are absolutely dependent upon the local people for these statistics. And it is the same way whether we have a department of public health or any other federal department, after all it is a local problem, and the furthering of such work as Professor Phelps has referred to here this afternoon in my mind is one of the most hopeful indications of what we may expect in the near future.

Dr. M. J. Rosenau: I will be brief, although there is much that I am tempted to say; and I think you will agree with me that it is an act of considerable self-restraint that I refrain from discussing Doctor Anderson's splendid paper, which to me was very much like a twice-told tale admirably told. You may not know that for twenty years I participated in many of the activities that he told us about this afternoon. While I am on my feet, however, I want to say a word about the remarks that Professor Phelps has favored us with this afternoon. I do not agree with what Professor Winslow has said, that Professor Phelps has chosen an attractive title to his paper. I do not believe that this is an experiment, I believe it is an accomplished fact, and I believe it is one of those things in coöperation which is not only going to extend throughout Massachusetts but neighboring and distant states and foreign countries. We all know that the weakest link in the sanitary chain is the country, and it is the country that must be reached in order to prevent infection spreading and flowing to the city. One cannot go to any meeting, whether medical meeting, sanitary or hygienic congress, philanthropic association, or uplift society of any kind today, at which one does not hear that keynote word, coöperation. We almost grow weary of the reiteration and sometimes feel that it has been overworked. But after all it is necessary: coöperation, not only between Federal Government and state, and between state and local authorities, and between local authorities and the people themselves, but coöperation between all the agencies concerned, one and another interlocking in helpful ways. It must be perfectly evident to anybody who is at all familiar with the situation, that the real work in preventive medicine rests with the people themselves, guided by the local health authorities; furthermore, that sparsely settled districts and small communities cannot effectively and efficiently apply all the modern scientific methods, which are sometimes expensive and cumbersome, and which requires experts that cannot be supplied by each little township. It, therefore, requires the kind of coöperation and concentration of effort which Professor Phelps has so ably and so well described, and which he has so efficiently put into effect. The principle is not new; we have had coöperation in Metropolitan water supplies, in sewage disposal, in school, police, fire and other things. It now is time to apply the same idea to health. Professor Phelps modestly says that the credit and honor belongs to Professor Sedgwick. Perhaps it does. Professor Sedgwick in turn turns it over and says it belongs to Professor Phelps. Perhaps it does. So far as I am concerned, it may belong to both of them, for I think there is enough in the proposition, that is, enough honor, for all.

JUDGE NOT, THAT YE BE NOT JUDGED! DOES THE AMERICAN FEDERATION FOR SEX HYGIENE SPEAK THE TRUTH?

Robert N. Willson, M.D.
Secretary, American Federation for Sex Hygiene.

In the July number of the American Journal of Public Health appeared an article that called into question not only the accuracy, but seemingly the honest intent of the very few figures and statistics displayed by the American Federation for Sex Hygiene in its exhibit in connection with the International Congress on Hygiene and Demography. It is not quite clear whether the writer of the article aimed at perpetrating a bit of literary buffoonery or whether he really intended his effort as a serious criticism of honest men who have an honest, and a purely philanthropic purpose in view. Were it not for the fact that the article is only partially personal in its combined use of a semi-maudlin levity and a covert venom, it would merit in reply only a dignified silence. Inasmuch as the desire and intention of the Federation to present accurate facts and figures to the public is publicly impugned, and inasmuch as our critic has recently held, however improperly, so prominent a position as that of Secretary-General of an International Congress on Hygiene the matter at once loses its personal nature, and forces upon the Federation the necessity of a reply both as an obligation to itself and a duty to the public.

Not long before the death of the president of the American Federation for Sex Hygiene, Dr. Prince A. Morrow, one of a series of unnecessarily discourteous, almost boorish communications, addressed to the Secretary of the organization by the said Secretary General (all bearing upon the facts and figures criticized in his recent article) was brought to the formal notice of the Executive Committee. Doctor Morrow and the present writer were both in attendance upon that meeting. Both had had an active part in the preparation of the Federation's exhibit, which, it may be remarked, approved itself to the Committee of Awards to the extent of warranting them in conferring a Certificate of Superior Merit (the highest award of honor) for two out of three portions of the exhibit, the latter of the two containing the data which have so exercised the Secretary General as to bring about the loss of his sense of professional courtesy, if not also of his reason, for the time being.

Both Doctor Morrow and Doctor Willson had experienced at first hand the unwillingness or inability of the Secretary General to adopt either a tolerant or an intelligently conservative view of the Federation's attempt to inform the public with regard to the facts and figures that are their due. At least one other member of the Executive Committee knew the Secretary General in person. His communication was received in a dead silence, broken finally by the now departed chief, who simply said, "Gentlemen, I think we need not pay any attention to this communication."

There was no further discussion of the subject. At the close of his recent semi-frivolous article the same Secretary General says of Doctor Morrow, "Search his writings for the manifestations of a cynical, fanatical or mysterious mind, and you will go unrewarded." He will, therefore, no doubt, in accordance with this sentiment cheerfully accept Doctor Morrow's quiet, orderly estimate of his worth as a critic.

So much by way of simple comment upon the equipment of this one-day a municipal office holder, now a Secretary General, and once more an appointive health officer,—ever a doctor of fortune rather than of medicine or science, who rather discourteously and altogether unprofessionally takes both the Federation and an investigator and social worker, albeit a practising physician, to task for a series of approximate facts and figures, at least an important portion of which he (the Secretary General) still holds impounded in the Government printing office, and which, though he criticises them in public, he has not yet given the public the opportunity to read in their proper context. There is needed hardly the further statement that when the proof of the original article quoted and referred to by the Secretary General was received by its author it had been so mangled and its sentences had been so rudely transposed ("in the printer's office," he was told) as to be unrecognizable and impossible of reconstruction except by replacing the galley with new manuscript. Figures misplaced and misquoted, sentences out of place, whole paragraphs inverted, and yet absolutely no one cognizant of the manner or method of the occurrence. A corrected proof was then promised in a personal note from the Secretary General, and when four months later (August 1) a request was made for the same, the reply was made, "I remember very well the extraordinary jumble into which your paper got, and I can assure you its proper order was restored." But still no corrected proof, and, instead, the *quasi*-criticism of its contents, not yet delivered to the public.

There are merely two points to which reply shall be vouchsafed, and to these, as already stated, for the sake of the public, not for my own gratification or because I personally feel that recognition is due such a critic.

I. Are the figures bearing upon American expenditure upon immorality and prostitution essentially correct, or are they not?

II. Is the estimate of the number of public prostitutes in this country, as given, indeed— ultraconservative, or at least well within the limits of conservatism, or is it not?

If an affirmative answer can honestly be given to both these queries then let us forget the interruption, also the disturber of the peace, and return whence we came to our proper spheres of interest and activity. Let us first consider my own table of figures, improperly quoted prior to their publication in the Transactions of the Congress.[1] The Secretary General finds me more than ready to apologize to the American public for having stated that there are cited in the census 2,406 cities instead of 2,405.[2] Is the addition or inclusion of one city too many such a grave error as to bring down upon a long suffering public such as his? He fails to state, be it noted, that he has allowed this egregious error to remain in my article in the Transactions, and, though he has read the final proof, has neglected to call it to my attention! Verbum sapientibus!

But as to the figures themselves! Are they within the limit of credulity? The New York Police Department estimates about 30,000 public prostitutes in New York. These figures are generally accepted as fairly accurate. I estimated 8,000 as an ultraconservative figure! In Chicago the authorities consider the conditions very similar to those of New York. For Philadelphia I estimated 5,000, before the Vice Commission was appointed and advertised as no Vice Commission ever has been before. The Vice Commission, after a year and a half of investigation, and after a well-recognized emigration by the underworld, still found 3,000 public women actively plying their trade. In San Francisco I estimated 5,000. Recent official state and municipal investigations have shown this number to be only a fraction of the ever new, and constantly replenished army of native and foreign prostitutes. The municipal clinic for the examination of prostitutes—one of the forms of public licensing of immorality which transcend all other public shames, and one which I took occasion to denounce at the public meeting in Washington at which the head of the clinic boasted of his participation in San Francisco's disgrace, has been ordered discontinued as ineffective and inimical both to the public morals and the public health. And so on down the line! The smaller cities actually harbor, as a rule, a larger ratio of public prostitutes than the average city of greater size. The nearer their vicinity to a still larger community, the more of a vicarious prostitute population in the latter, which often furnishes the greater portion of the immoral life of the two. There is no better illustration of this principle than is furnished by the New Jersey cities lying adjacent to large cities in Pennsylvania and New York. But as a rule cities of moderate population support more than their share of public prostitutes. Our joco-serious Secretary General considers it preposterous that the estimated number of public prostitutes (544,350), and the "well over 1,000,000 clandestine prostitutes" should even approximate accuracy—because, forsooth, he does not wish so to believe. He cites no other valid objection! Nor has he advanced a single argument worthy of the name to prove that my figures are exaggerations rather than diminutives of the truth.

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[1] This table has also appeared with a full explanation of the basis of estimation of its figures in my book, "The Education of the Young in Sex Hygiene." This fact is evidently not known to the Secretary General.

[2] A still more recent series of data issued by the Census Bureau shows a still further inaccuracy in these figures but none that seriously bears on the general result.

As a matter of fact, accurate figures cannot be furnished, as yet, either for the number of prostitutes or the incidence of the social diseases among the innocent and the guilty. For this very reason the policy of the Federation from the beginning has been and is to avoid definite figures until such time as accurate data are in hand. Frankness with the public on this point has been our method and policy from the inception of the movement. No one who has done any actual work in the field of sociology questions the sanity and the reasonableness of the figures submitted. Only a newcomer and an upstart, and a poorly informed meddler at that, would attempt to create a lack of confidence on the part of the public in a matter so critical from the standpoint of the public health. If there are 500,000 and upward of unfortunate women living a life of public shame in America, the people ought to and soon will know the fact, and demand the reason. Then they will learn that there are about 14,000,000 young men constantly in this land. Also that upwards of 800,000 of these come to maturity every year. Physicians are more and more of one mind in believing that upwards of 50 per cent. of all young American boys and men are infected with venereal disease (not including innocent infections), before they have reached a marriageable age. This statement of approximate accuracy implies the exposure of more than 7,000,000 young men every year, and most of them, probably, many times. Include now the married men, who go far toward supporting the public prostitute class, add the immoral old men and middle aged men, and the school boys, and the messenger boys, and the young boys living in both poor and sheltered homes—and none of them included in my classified list, and 500,000 prostitutes will not suffice to go round. Hence the growth of a clandestine prostitute class, to which I shall make only passing reference at this time. No attempt at misleading by such methods could be possible! The only conclusion at which any sane and even-tempered student of the problem can arrive is that there is an enormous army of poor, sorry girl lives in America, as in every other land, wrecked and set adrift in every instance by some man. All are sooner or later infected with contagious disease. Our attempt is to save the girls of the future from filling the ranks of these wretched ones of the present and past. Few of them live over five or six years after entering upon their fiendish trade. A few do live, even into old age, as has been forcibly pointed out. The murder of those who die is to be laid some day and once for all upon the men, whose retribution has up to now been simply the curse of venereal disease. So-called criticisms like that of the Secretary General aid in intensifying the dense cloud of shame that envelopes American manhood, also so called. For we must all admit that until public prostitution is wiped from our escutcheon there is no true American manhood!

However little he may have intended it to have such an influence, this jester with serious things has trifled once too often and with a problem that will some day afford him small satisfaction in the thought that he has hindered rather than helped toward its solution. Five hundred thousand public prostitutes or 499,000? What matter which! Let us save the young girls who are hurrying to replace the 500,000, or the 499,000, unless men like him are promptly shouldered out of the way. This is the real business in hand! He is only helping those who would continue them in a life of sorrow and disaster.

His lack of practical knowledge of boys and men is so complete as to be pitiful. Only one other have I met of such an inexplicible simplicity,—an old schoolmaster, of fifty year's teaching experience, who had known only one instance of immorality among the pupils of half a century, and who would hardly credit a case of physical infection in another one of his boys when brought to his attention. The boys, and many of the city girls of today would laugh in their sleeves at the "old auntie" Secretary General, as they would call him. "I have something against you," he murmurs, "in the matter of depraving the minds of women." By this he means our attempt to enable the women by full intelligent knowledge to choose clean husbands instead of unclean, those that will guarantee them health, and live, sound babies, instead of disease, abdominal operations, and dead babies, or worse than dead. The women, let it be said, do not consider that we are depraving their minds, and I doubt very much whether they will yield to any one the right of judgment on this point.

Have we then no means of proving with reasonable accuracy how many of our young boys and men dishonor their mothers and their sisters and their future homes by living a clandestine immorality which they would not tolerate in the girls they intend to marry? Whither has fled all the wisdom and practicality of this Secretary General, whose hairs have grown gray in his confidence in men? Let him look upon the records of the dispensaries and of the quack physicians! Let him consult the drug store clerks! Let him at last come home to the general medical practitioner and he will learn a fact or two that should have been apparent to him had he followed the calling of a physician or had he been a live man among men. If he still doubts, let him stand beside the operating table and see young girl after young girl unsexed as the result of infection by a boy or man, mother of a home after mother of a home mutilated as the result of her infection by a trusted husband, contaminated before or since marriage! Hold fast to your suspiciously trustful views, Mr. Secretary General, if you will! But do not ask us to withhold from the women of today and tomorrow the official figures of France to the effect that 25,000 babies died in one year in that country alone from syphilis. There is no reason to believe the figures would differ here, had we a sufficient number of men who were willing that figures should be recorded and known! It is men of your stripe that make it possible that syphilis and gonococcus disease are still officially almost non-existent contagions. Ask your army and navy authorities why the venereal diseases overtop the incidence of all the other ailments combined, if your silly confidence in the virtue of boys and men is based upon solid ground. Ask them why they consider it necessary even to take the ill-advised step of publicly assuming that soldiers and sailors will go out from their barracks and their ships to violate girls and women, and of furnishing them in advance with a preventive packet. When a body of earnest men such as comprise the Federation tells the women of this land that there are clean boys and men, but that they must know how to choose them from the unclean, it is not "depraving" the minds or the hearts of the women; rather is it encouraging them to believe that the dayspring is at hand. When it tells them, as it repeatedly has, that "not a majority" of the boys and men are clean, it tells them a burning truth, and one which I believe in my heart this man realizes even though he refuses to acknowledge it before the world of men and women! We are insisting that they have a right to life and to health and to living children. Heretofore they have been denied the truth! He holds up the hands of a prude, of a dear old lady, as it were, and bemoans the fact that we are contaminating them "with an obscene superstition, a filthy dream." It is, indeed, a filthy dream, rather a nightmare—the thought that he and men of his ilk venture to utter a word that will hinder the placing of woman where she belongs, at the head of the home. How does he sanction the devotion of a portion of every city to the perpetuation of a double standard of moral and physical health? How is the brothel supported if men are immune from the desire and the intent to lust whether or no? Who is to stop the flow of physical disease out of the infected section of the city into the clean woman and her babe through the husband, whom he characterizes as worthy of his belief, "infinitely more nourishing, than any possible derivative of the facts possible to be entertained."[1] I will tell you! It is to be the woman herself, when she has learned the shallow mockery of sophisms like his! When she looks for herself and sees what there is to see of feminine sacrifice upon the operating table! When she scans the long procession of the infant maimed and dead! When she sees the long column of once clean girls marching from city and country to fill the houses of ill fame! Then, and then only, will the housecleaning take place, which we trust will carry you, Mr. Secretary General, out with the rest of the active and passive abettors of the world's great crime.

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[1] The Secretary General evidently did not lean upon a superlative grammarian in the construction of this sentence.

And finally (and very much less important), Is the American nation expending $3,000,000,000 and upwards upon public immorality and its consequences, or is this figure out of all proportion to the actual expenditure? Let us grant for the sake of argument that my ultraconservative table is what it purports to be!

Let us assume that there are 500,000 public prostitutes scattered over this wide land! The recent disclosures in New York and Chicago and Philadelphia and San Francisco have made it clear that the average earnings of these girls amounts to not less than double the figure estimated by me. No one other than a constitutional objector would question the existence of a number of clandestine prostitutes in every factory, mill, and department store in the land. The Secretary General objects to the word "myriads" of industrial establishments, and yet even his mind must be able to grasp the fact that there are myriads, in the common use of the word. Some of these wantons charge their patrons (they call them "customers" or "friends") twenty-five cents, some charge twenty-five dollars. The professional prostitute scorns her who sells her virtue for a mere good time, or for anything other than hard money. So the wide country over in 2,405 cities, there are being spent directly on these women amounts varying between the $15,000,000 estimated by the people of Chicago for their own annual direct tribute to immorality to the thousands and hundreds of thousands squandered in the little cities that hardly earn the name. It does not require very active figuring to total $3,000,000,000. Many have estimated $1,200 as the average annual earning of the public prostitute. By no means in all or even in many instances does even one half of her earnings reach her own pocket. But estimate $1,000 annually, as the earnings of 500,000 women. At once there is an expenditure of $500,000,000 without going beyond the first deal in the procedure. Now add the cost of treatment of the venereal diseases in these girls, and in the boys whom they infect. The vast majority of the girls in the houses throw away $2 weekly in the belief that a so-called medical examination can protect them and their patrons. All are sooner or later permanently diseased! All infect their "friends!" Their "friends" very frequently infect their homes, meaning their clean wives and children! Every new case means money, money, money! Every new operation on a woman's abdomen means money! Every new injection with an anti-syphilitic remedy means money! Every blind asylum calls for money! Every foundling asylum costs something! Every venereal ward and dispensary, every nervous ward, every gynecological ward, every other service largely dependent upon the venereal diseases for material, costs money! These are all part of the expenditure of American immorality! Broken homes, divorces, lawsuits are becoming more and more frequent as the result of venereal disease, and all cost money! Is a general total of $3,000,000,000 too large or too small an estimate, to cover all this demand when we admittedly require $3,200,000,000 to supply the craving for immorality's twins, alcohol and tobacco? I think no more need be said on this point. My attitude toward the Secretary General is simply and purely one of sorrow over his low moral tone. I cannot imagine his object in writing that which can only do harm. In more than fifteen closely printed pages, not one helpful, constructive thought! Of one thing, however, I am sure. The man who conceived his article is an obstructionist, a caviller! He is wickedly behind the times in his false philanthropy, if he is actually honest in all he has ventured to write and say! In his peculiar state he had only one duty, that of preserving a solemn and, probably to him, an awful silence. He will forgive me if I remind him in closing of a pithy verse, said to have been fashioned in the dog-star:

"The man who speaks in a score of tongues,
When all is said and done,
Don't hold a match to him who knows
How to keep still in one."

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SPECIAL TRAINING FOR HEALTH OFFICERS.

A long step forward in the special training of health officers has just been taken in the organization of the "School for Health Officers," of Harvard University and the Massachusetts Institute of Technology, acting in coöperation, of which the official announcement is made public as we go to press.

By coöperation especially arranged between the two institutions, it now becomes possible for properly qualified persons on payment of an annual fee of $250 to obtain access to the remarkable resources of the Harvard Medical School and other departments of our oldest university, as well as to the chemical, biological, sanitary and engineering opportunities offered by a great modern technical school. How remarkable these opportunities are can only be appreciated by an examination of the announcement itself, copies of which may be obtained on application to the director, Prof. M. J. Rosenau, at the Harvard Medical School.

No single prescribed curriculum is laid down which all must follow, but from the many courses offered members of the school will be expected to choose such as their preparation warrants or their needs indicate. No degree of any kind is required for admission and no degree will be awarded for the completion of the course but, instead, a certificate to be known as the Certificate of Public Health (C. P. H.) will be given to all who complete satisfactory courses and requirements. In order to obtain the certificate in one year it will in general be required that the candidate shall be either a graduate in medicine, or in biology and public health, or be otherwise highly qualified. Failing these special qualifications, two or more years will ordinarily be necessary in order to obtain the certificate.

No one will be admitted to the school who has not completed at least two years of ordinary college work, including chemistry, physics, biology and French and German, or who is not otherwise specially qualified.

Persons already engaged in public health work will be admitted under certain conditions to special courses in the school, and every facility will be offered for obtaining equipment in tropical hygiene, public health administration and other practical aspects of the health officers' profession.

It is hardly necessary to say that the organization of this high-grade school probably marks a distinct epoch in American public health service, and no one can possibly be more interested in it than the members of the American Public Health Association. The editors of the Journal extend their congratulations to the two institutions which are thus coöperating in an interesting, timely, and most important enterprise, and venture to predict, for this and all similar efforts to improve and broaden the special training of health officers, immediate success. It still remains, however, for the various members of the health officers' profession to see to it that the public, which is even more interested than they are in the success of schools of this sort, shall make sure that a reasonable tenure of office and proper salaries await those who are ready to devote their lives to the profession, and much popular education along this line still needs to be done.

THE COLORADO SPRINGS MEETINGS.

As we go to press the American Public Health Association is in session in Colorado Springs with nearly 200 members in attendance. Preliminary reports indicate a meeting of unusual interest both in representation and in the character of the discussions. Particular attention was given to the symposium on Pure Food which occupied the opening session. The papers presented on that occasion will be published in full in the October number of the Journal and we trust will serve to lessen the confusion which surrounds that difficult subject and help to turn a now irresistible public sentiment into channels marked by a greater degree of sanity and scientific reasoning than is now the case. To this end the Journal will lend its best efforts.

THE BACTERIOLOGY OF CHRONIC PROSTATITIS.

A. Parker Hitchens, M. D., and C. P. Brown, M. D.*

Read before the Laboratory Section, American Public Health Association, Washington, D. C., September, 1912.

When cultural methods began to be applied to the study of materials from the various parts of the body in health and in disease, the genito-urinary tract was among the first to receive attention. One year after the appearance of Koch's work on "Die Wundinfectionskrankheiten," Neisser (1), 1879, described the gonococcus and assigned to it the specific pathogenic function it is now known to possess. Although Bokai (2), Leistikow (3), Kraus (4), Arning (5), Sternberg (6), Oppenheimer (7), Bockhart (8), and Neisser (9) himself attempted the isolation of the gonococcus in pure culture, Bumm (10), 1885, was apparently the first whose efforts were crowned with success. Inoculation experiments finally established beyond question the etiologic role of the gonococcus.

As has been found especially by Van der Pluym and Laag (11), Waelsch (12), Bockhart (13), Aubert (14), Guiard (15) and Ayers (16), urethritis may be caused by other organisms than the gonococcus, the M. catarrhalis, B. coli, Staphylococci, etc.

Bumm (17), Turro (18), and Legrain (19) are among the earlier investigators who studied the bacteria found in the infected urethra. They describe many common air and water species undoubtedly incidental which may take no part in any existing morbid condition. Lustgarten and Mannaberg (20), Petit and Wassermann (21), Melchior (22), and more recently Pfeiffer (23) and Stanziale (24) have made most careful studies of the flora of the normal urethra. For technical reasons the reports of Pfeiffer and of Stanziale are the earliest made that may be accepted seriously. The latter studied conditions other than gonorrhea in twenty-seven patients, and found diphtheria-like bacilli eleven times, staphylococci thirteen times and streptococci three times. From comparative studies he was able to conclude that the urethra in diseased conditions contains no unusual bacteria other than the gonococcus; those usually found in health are, however, present in greater numbers.

Guiard (25), Banzet and Kresser (26), Cohn (27), Cumston (28), Young, Geraghty and Stevens (29), Clark (30), Rathburn and Dexter (31), and Cabot (32) have reported the results of examinations of material from the urethra and prostate. Others have made studies for specific purposes, as for instance, that of Saxe (33) who wished merely to determine the length of time the gonococcus may persist in the urethra. No cultures were made, the gonococcus being sought upon stained slides. One of the most elaborate studies of the genito-urinary tract is that made by Tomohara Tanaka (34) upon cystitis.

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Few studies have been made of the anaërobic bacteria present in the urethra. Jungano (35) has isolated the Micrococcus foetidus, B. perfringens, B. neigeux, B. ramosus, B. of malignant edema, the B. intestinalis of Metchnikoff, and B. tethoides. He states that these organisms are present both in health and in disease. Guiard (36), Janet (37), Nogues (38) and Hogge (39) admit the possibility of the existence of aseptic urethritis. Such a conclusion has no value unless the association of anaërobic bacteria has been eliminated. Jungano (40) and Motz (41) do not believe that such a condition exists.

All this work confirms the fact so clearly demonstrated by Stanziale that the accessory bacteria found in chronic urethritis of gonococcal origin are only those that may be found normally. These include pyogenic staphylococci, both albus and aureus, streptococci, diphtheroids, and occasionally B. coli. Non-liquefying white staphylococci are present in many cases. The importance of these organisms, especially in chronic inflammatory conditions of the urethra is evident. In the healthy canal they exist without exerting any pathogenic influence. When, however, the gonococcus arrives and sets up inflammation a change in the nature of the fluids in and about the urethra takes place, resulting in a diminution of their antibacterial power. Those organisms already present then are furnished with a most suitable culture medium and some of them increase in virulence. Thus they continue the inflammation after the gonococcus has become of minor importance or has disappeared.

While Neisser, Finger and several others accept the persistence of the gonococcus in chronic urethritis and prostatitis for a year, Wassidlo, Ruggles, and Goldberg attach great significance to mixed and secondary infections (Notthafft, Arch. f. Derm. & Syph., 1904). It is not improbable that after the active process has subsided the lining membrane of the urethra and prostate is left in such a state of hypertrophy or other morbid condition that the mucous glands produce a fluid abnormal in quality or in amount and suitable as a culture medium for the accessory bacteria. It might be suggested also that if something of this kind exists the irritation is further kept up by the metabolic products of the bacterial growth. It is possible that one explanation applies in certain cases and in other cases another. That some such difference exists is strongly suggested by the fact that treatment of chronic infections of the genito-urinary tract by vaccine therapy as suggested by Sir Almroth Wright is sometimes followed by positive results while in others the effect is negative. It must also be remembered that the structure of the prostate gland is peculiarly adapted to the persistence of bacteria within it. The blood supply is such that focal infections may very readily occur. In this regard it is to be compared with the tonsil which may harbor streptococci for years without calling attention to this locality in any way as the cause of a chronic and persistent general intoxication.

To obtain material from various parts of the genital apparatus great care must be taken to avoid the possibility of contamination from other parts. The purpose of an investigation influences the technique. Cohn (42) irrigated the urethra with boric acid solution until it flowed away clear. A sterile tube was inserted as far as the bulb; this was dried with sterile cotton after which the prostate was massaged. Secretion was obtained with a platinum loop or upon a pledget of cotton. Pfeiffer (43) in his study of the bacterial findings in the normal male urethra used a sterile metal catheter like the tube of an endoscope through which he introduced a sound or platinum wire. By such a method he could not differentiate between the bacteria present in the anterior urethra and those existing in the deeper parts since those near the meatus would be pushed back by the tube. To overcome this source of error Stanziale (44) constructed a special apparatus which enabled him to ascertain the position of the various germs at definite distances from the orifice. This instrument consists of a straight, cylindrical metal cannula 24 cm. long, corresponding to No. 18 of Charriere's scale. The tube is graduated in centimeters to show the depth to which the instrument has been inserted. Inside this tube slides another similar tube but about 2 cm. longer. In position the second tube projects about 1 cm. beyond the other. Its front end consists of two fairly large spoon-like branches. When they are closed they form an olive-shaped end, thus facilitating the introduction of the instrument. When it has been passed to the desired depth, the inner tube is pushed in about 1 cm. farther permitting the olive to open and spread the urethra. The platinum spoon is then pushed in and material collected. The spoon is then pulled back, followed by the inner tube and the instrument is withdrawn.

Young, Geraghty and Stevens (45) studied nineteen cases. They made twenty-six examinations, some cases being studied more than once. The foreskin, if present, was retracted and washed thoroughly with green soap and water. The patient urinated in three glasses. A sterile urethroscopic tube was introduced after thoroughly washing the urethra with sterile water. The tube was again thoroughly washed and cultures made. The prostate was then massaged and the pus collected directly into a culture tube or on a platinum wire. In most cases agar plates were used. Hydrocele agar was used for seven cases. No gonococci were found. The plates were made from the culture tubes and not directly from the expressed secretion.

In our work the external genitalia were thoroughly washed with tincture of green soap and carefully rinsed with a 1 to 2,000 solution of bichloride of mercury. From the douche bottle, elevated about six feet, the urethra was flushed at least one half dozen times with sterile physiological salt solution (0.85 per cent.), probably 250 to 300 cc. being used on each patient. For each patient a fresh sterile glass nozzle was replaced in the rubber tube leading from the bottle.

After thus washing the urethra the prostate was massaged, the patient was placed in a reclining position upon a table and a sterilized urethroscopic tube lubricated with sterile liquid petrolatum was introduced. The expressed fluid was collected through the tube by means of a glass inoculating pipette. The massaging, the passing of the tube and the collecting of the fluid were all done by different persons, so that likelihood of contamination was practically eliminated. A drop or two of the fluid was put upon the surface of an ascitic agar plate, the same amount was dropped into a tube containing ascitic bouillon, and from the remainder slides were made. The material on the plates was spread carefully over the surface by means of a previously sterilized glass spreader. After distributing the material on the original plate the spreader was then rubbed over the surface of two other plates successively, without reinoculation. The following day the ascitic bouillon culture was streaked on ascitic agar plates and the colonies studied in the same manner as those from the original plates. All cultures were incubated at 38° C. for 24 hours, after which the colonies were fished.

The agar was the ordinary nutrient agar containing about ten per cent. sterile ascitic fluid. The reaction of the agar was between plus 1.0 and plus 1.5.

Fishings were all made to ascitic agar slants. After twenty-four hours incubation at 38° C. they were stained by Gram and by methylene blue. They were then studied by the ordinary methods to determine their identity. The results of this study are noted in the accompanying chart:

The white non-liquefying micrococci grouped like staphylococci were not studied further. Both strains of the B. coli ferment dextrose, saccharose, and lactose.

The uniformity with which diphtheroid bacilli were found led us to attempt their further classification. Numerous attempts have been made by other workers to classify diphtheroid bacilli but no one seems satisfied with the present methods. The biometric method suggested by Professor Winslow, since it is based upon the relative acidity produced in carbohydrate media and not upon the arbitrary amount necessary to turn an indicator, offers a distinct advance in determinative methods.

TABLE I.

Number.	Date.	Staph. aureus.	Staph. albus.	Non-liquefying white cocci.	Strepto-cocci.	Diph-theroid.	Bac. coli.	Gono-cocci.
1	1/18		+	+	+			
2	1/18			+		+		
3	1/18		+		+			
4	1/18		+	+	+	+		
5	1/18					+		+
6	1/25	+		+	+	+		
7	1/25			+	+			+
8	1/25		+	+	+	+		
10	2/1		+			+		
11	2/1		+	+		+		
13	2/1	+	+		+	+		
14	2/1	+		+				
15	2/1		+		+	+		
16	2/1	+	+	+	+	+		
17	2/8		+	+	+	+		
18	2/8	+	+		+	+	+	
19	2/8		+	+				
20	2/8		+	+	+	+		
21	2/8			+	+			
22	2/8		+	+	+	+		
23	2/8		+	+		+		+
24	2/8	+	+					
25	2/8	+		+		+		
26	2/8			+				
27	2/8			+	+			
28	2/8					+		
29	2/8	+	+	+		+		+
30	2/15			+	+	+		
31	2/15		+			+		
32	2/15		+	+		+		
33	2/15			+	+	+		
34	2/15		+	+				
35	2/15			+		+		
36	2/15		+		+	+		
37	2/15	+			+	+		
39	3/7			+		+		
40	3/7			+	+	+		
41	3/7		+	+	+			
42	3/7			+		+		
43	3/7	+		+	+			+
44	3/7		+	+		+		
45	3/8			+	+		+	
46	3/8	+			+			
47	3/8			+	+	+		
48	3/15		+	+	+			
49	3/15			+	+	+		
46 cases		11	24	34	27	31	2	5

SUMMARY.

Staphylococcus aureus	11	times
Staphylococcus albus	24	times
Non-liquefying cocci	34	times
Streptococci	27	times
Diphtheroids	31	times
B. coli	2	times
Gonococci	5	times

We have under way a study of these strains by the biometric method. Those isolated by us fall into the following groups when classified by their reactions on the Hiss serum-water-medium.

TABLE II.

Diphtheroid Bacilli.

Culture. No.	Dextrose.	Malrose.	Sacchatose.	Mannite.	Lactose.	Dextrin.	Inulin.	Glycerine.	Gelatine.
20	0	0	0	0	0	0	0	0	0
29 A.	0	0	0	0	0	0	0	0	0
33 C.	0	0	0	0	0	0	0	0	0
15	+	0	0	0	0	0	0	0	0
17 A	+	0	0	0	0	0	0	0	0
32	+	0	0	0	0	0	0	0	0
37 B	+	0	0	0	0	0	0	0	0
42 A	+	0	0	0	0	0	0	0	0
8	+	+	0	0	0	0	0	0	0
11 A	+	+	0	0	0	0	0	0	0
18	+	+	0	0	0	0	0	0	0
16	+	+	0	0	0	0	0	0	0
23	+	+	0	0	0	0	0	0	0
29 D	+	+	0	0	0	0	0	0	0
40	+	+	0	0	0	0	0	0	0
44	+	+	0	0	0	0	0	0	0
49	+	+	0	0	0	0	0	0	0
47 A	+	+	0	0	0	0	0	0	0
12 B	+	0	+	0	0	0	0	0	0
5	+	0	+	0	0	0	0	0	0
13 A	+	0	+	0	0	0	0	0	0
9 A	+	0	+	0	0	0	0	0	0
28	+	0	+	0	0	0	0	0	0
6	+	+	+	0	0	0	0	0	0
9 B	+	+	+	0	0	0	0	0	0
12 A	+	+	+	0	0	0	0	0	0
29 B	+	+	+	0	0	0	0	0	0
39	+	+	+	0	0	0	0	0	0
47 B	+	+	+	0	0	0	0	0	0
11 B	+	+	+	0	+	+	0	0	0
33 B	+	+	+	0	+	+	0	0	0
36 B	+	+	+	0	+	+	0	0	0

Morphologically and culturally these organisms cannot be arranged to agree with a classification based upon their carbohydrate reactions. This fact suggests the possibility that there may be several morphologic varieties in each group as is the case with true diphtheria bacilli.

It is noteworthy that in these forty six cases of chronic prostatitis of gonococcal origin the gonococcus was isolated but five times and was seen on stained slides but nine times. From a public health standpoint such cases are of the greatest importance. It has been demonstrated many times that the accessory bacteria may be present in such abundance that although gonococci are present they are demonstrable only by repeated examination and by special methods. Unless the examination has been made at least three times and at least once by the provocative method no case of chronic prostatitis or posterior urethritis should be released as non-infectious.

These cases were selected by Drs. Uhle and McKinney from their service at the University of Pennsylvania and the German Hospital. It is a pleasure to acknowledge our indebtedness to Drs. Uhle and McKinney for their kind coöperation in carrying out this work.

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FARM WATER SUPPLIES, WITH SPECIAL REFERENCE TO DAIRY FARMS.

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Three types of water supplies may commonly be found upon farms. First and most numerous is the shallow well or dug well, varying anywhere from 15 feet to 40 feet or even 50 feet in depth, depending upon the amount of labor necessary to reach the water-bearing strata, and in close proximity to the house or barn.

Second in number throughout New England would probably be found the wells of similar character or springs situated at a greater distance from the buildings and with pipes leading the water directly to the buildings, either by gravity or by the use of some pumping apparatus, wind power or small engine.

A few farms are found having water supplies from the deeper sources, driven wells or artesian wells, but these are relatively rare. The character of the soil has a very considerable bearing upon the character of the water and the ease with which it may be polluted. A gravelly, open soil containing stones of varying size may offer so little resistance to the passage of organisms and materials from barnyards, drains, etc., that the water is constantly in a state of contamination. Unfortunately, this cannot be detected by taste or smell in most instances because it is only when the pollution becomes very severe and the amount of freshly decomposing organic matter relatively large that compounds would be formed by putrefactive change in sufficient amounts to give a distinct taste or odor. In fact, certain waters which are constantly polluted seem to have a particularly soft and pleasing taste, especially if the wells are of considerable depth so that the water is cold, and if, at the same time, it is clear and free from color. Should such a water supply, however, become polluted with bacteria of infectious disease, the danger from this source would be enormous, and undoubtedly many deaths from typhoid and other diseases of that character are due to this type of pollution.

In the early days when no account of the purity of the supply from the bacteriological standpoint was considered, because there was no knowledge of the bacteria themselves, the custom of establishing the water supply for a farm at the point most convenient for the users, either in the house or barn, seems to have become formulated in New England. After examination of several hundred farm water supplies, especially on dairy farms from which milk is sent to Boston, I am convinced that the consideration of the relation of the water supply to the barnyard, to the sink-drain, to the privy, or any other possible source of contamination, was rarely considered, and that the most emphasis was placed on establishing it at a point so that the amount of labor involved in carriage is the least, and the probable continuance of the supply through the year, the greatest. In many instances, therefore, wells which constitute by far the great majority of the supplies of individual farms are placed midway between the back door of the house and the barnyard, frequently on the edge of the barnyard, with no special reference to the drainage areas or drainage planes, and in such a position that if typhoid fever, or some other intestinal disease should occur in the house, the possibility of contamination of the water supply is distinctly great. While this is a condition which is found especially on old farms, it is not confined to them but may frequently be observed where the general planning out and building of an establishment has taken place within a very few years. The general plan followed in a majority of cases seems to be that of the very early days and the general assumption made that since no trouble occurred to our ancestors, no trouble can occur to us.

Of what may be regarded as the natural types of waters, namely, meteoric, surface and ground waters, there is a decided difference in the chemical and bacteriological characteristics. The meteoric waters are essentially those falling to the ground in the form of rain, snow or hail and since these are produced by the evaporation and condensation of moisture from larger bodies of water, like lakes, rivers, and the ocean, these partake somewhat of the nature of a distilled water, hence the common saying that rain water is a pure water, whereas a surface water may be very far from pure. Chemically, then, the meteoric waters are in general very soft, very low in the organic substances which we look upon as suspicious, and until they come in contact with the soil or with roofs of buildings, they contain very few of those micro-organisms known as bacteria, except the ones which are found attached to dust particles and floating in the air.

Since at the beginning of a storm these may be quite numerous, the rain falling in the early part of a shower, or the snow in the early part of a storm may be bacteriologically less free from polluting material than that which falls in the later periods of precipitation. From the standpoint of ordinary supply these may be largely disregarded, except in those instances where cisterns are provided for the collection of such waters. In New England it is not uncommon to find cisterns for the collection of rain water, not to be used for drinking purposes, but for other domestic purposes for which the softness and general purity makes it extremely valuable and satisfactory. In the south and west, however, cisterns are frequently employed for the storage of drinking water; in fact, in certain parts of the country almost the only drinking water available is that which has been conserved in this way. To safeguard, then, the character of such water it is necessary to have the cisterns or tanks properly covered to prevent infection from without, a screen to prevent the entrance of insects, such as mosquitoes, and it would probably be most advisable, if possible, to have some kind of by-pass or device by which the first water could be rejected, since this is bound to carry with it the deposits of dust, germs, and possibly more objectionable material which may collect upon roofs between storms.

The number of bacteria ordinarily found in such waters is very low. In the water falling near the end of a storm we may even find no germs since they are all carried down with the earlier fall. Such a pure water, if not contaminated later by being collected in infected or leaky cisterns, is undoubtedly very safe to use since the germs of disease are absolutely eliminated. It frequently, however, is very flat in taste or may partake of the taste of the shingles or other material over which it has flowed, but by proper aëration even rain water may become pleasing to the taste as well as of absolute safety.

With surface waters the situation is somewhat different. These are rain or snow water which has reached the ground and then by flowing over the surface has come into certain well defined water courses, brooks, rivers and ponds. The fact that the water has been in contact with the soil and that it perhaps has filtered for a small distance through the upper layers of the soil, has been sufficient to change the character of the water both chemically and bacteriologically. Chemically, those substances which are present in the soil in soluble form are taken up by the water. Consequently the chemical analysis of a surface water may vary markedly from the chemical analysis of the water before it reached the ground. Bacteriologically the same general effect is observed; that is, the water takes up mechanically particles of low specific gravity, organic matter, bacteria, etc., and we, therefore, find surface water ordinarily containing a considerable amount of dissolved and suspended material and considerable number of bacteria.

The amount and character of the dissolved and suspended material depend absolutely upon the character of the soil. In any water falling on a rich soil where nitrogenous material is undergoing decomposition we shall find the presence of the different compounds of nitrogen, free and albuminoid ammonia, nitrites and nitrates in varying amounts, depending upon the rate and amount to which the nitrification has been carried on in the soil. Similarly, we shall find the bacteria to be variable in numbers and in kinds, according to the character of the organic matter which serves them as food. A richly manured field, for example, containing organic matter in various stages of decomposition would give up to the water flowing across it or percolating through the upper layers of the soil, varying amounts of nitrogenous constituents and chlorine and possibly large numbers of bacteria, some of which might be of intestinal types or even of pathogenic types and, consequently, most undesirable.

The surface waters in densely populated regions, therefore, may be unsatisfactory for domestic purposes because of the large amount of organic matter, both of chemical and bacteriological character which find entrance to it. The germs present in the excreta of animals, both human and otherwise, are likely to occur in such a surface and when it is borne in mind that among these bacteria we may have causes of intestinal diseases or disturbances, the danger of using such water is evident. On the other hand, surface water from an uninhabited or sparsely inhabited region, especially where it is not in direct contact with richly fertilized fields, may be absolutely safe from the sanitary standpoint, because while they may contain some bacteria they would be free from pathogenic types. Occasionally waters may be found which chemically show all the marks of purity and yet which are polluted in the bacterial sense to such an extent as to render then undesirable. An instance of this sort came to my attention a few years ago in which a spring situated on a hill in a pasture was used as the water supply of a country house. Chemically, the water left little to be desired as to purity, but bacteriologically there was unmistakable evidence of pollution. Investigation showed that this spring was also used as a drinking place by cows and horses and that the intestinal bacteria found in the water were from these animal sources rather than from domestic sewage. At the same time it could never be regarded as a satisfactory condition and the water supply was, therefore, discontinued for a short time while the surroundings could be carefully freed from infecting material and fences put up to avoid repetition of the trouble.

Frequently, inspection of the source of a water supply will give all the data that are necessary to condemn, for it is evident that if drainage from privies, sink-drain, cesspools, barn yards, hog pens, or other animal quarters enters directly into the water supply it is unfit for human consumption. Then on the other hand, inspection may show nothing of the sort, while a chemical and bacteriological examination might reveal sources of pollution.

With deep wells and springs the chemical and bacteriological characteristics differ again from those of the surface waters, or shallow wells. In these cases the water has gone through, presumably, a process of natural purification by filtration. The lower stages of nitrogen compounds are oxidized in the soil by the bacteria there resident and occur in ground waters in the form of nitrates if previous pollution has taken place. The chlorine, however, would not be appreciably changed in this way. A water supply, therefore, showing high chlorine and nitrate content, but otherwise satisfactory, might easily be a purified contaminated water. Most shallow wells will show a certain amount of nitrates, especially if they are situated within a short distance of houses, barns, gardens, etc. If situated too close to such contaminating sources, the process of purification will not be complete but the water will show in addition to the nitrates, nitrites and free ammonia to some extent. The most striking evidence of all, however, is supplied by the bacteriological examination, for here we can show by direct and accurate means the exact extent to which pollution is taking place and the exact types of organisms which occur in the water. Whereas the chemical examination of a water supplies us with data which show inferentially that pollution has or has not taken place, the bacteriological examination shows us whether undesirable types of organisms are or are not entering the water at the present time.

The examination of the farm water supplies in the laboratory may be carried out by the application of the usual sanitary chemical examination combined with the bacteriological examination. To do this requires in most instances elaborate laboratory fittings and means that the samples must be shipped to a laboratory with all this equipment in order to obtain the necessary data. When we consider exactly the meaning of the information supplied by the chemical examination, we see that it is after all only another way of expressing our belief that pollution with intestinal organisms, or with undesirable material at least, has taken place or is taking place.

Without discussing here the significance of albuminoid and free ammonia, nitrites and nitrates, it is sufficient to say that these expressions convey to the trained mind, a picture, depending upon the amounts of such materials found, of a water supply receiving polluting material, or of a water supply which has in the past received such material, but is receiving it no longer. They give absolutely no information regarding the presence of undesirable types of bacteria at the moment, and it is only by an elaborate study of the relation of carbon to nitrogen that we can determine whether the polluting material was actually of animal origin or not.

By the bacteriological methods, on the other hand, we are able to show directly the presence or absence of the undesirable intestinal bacteria, and if they are found we have every reason to believe that they came only from human or at least animal sources, and that they may be accompanied by the still worse pathogenic species, such as typhoid bacillus.

Furthermore, the necessary facts as to pollution can be obtained by a bacteriological examination of the water, conducted without very elaborate laboratory facilities. It is even possible to make a house to house canvass, actually beginning the examination of the water supply of each while still on the premises, if one will take the trouble to carry sterilized culture media and the limited necessary equipment for the proper making of a few plate and tube cultures. It is true that one cannot conduct elaborate quantitative experiments in this way and that here the laboratory is an essential, but in view of the perfection to which the presumptive test for intestinal organisms has been brought, we can determine the main point, that is, whether the water supply is a polluted or an unpolluted one, without actually making the enumeration of the number of bacteria per cubic centimeter or the relation of counts of body temperature to room temperature types. Inoculation of dextrose broth and lactose bile either in bent tubes or in tubes containing inverted smaller tubes or vials can be carried out by the trained bacteriologist very quickly and effectively, using only an alcohol lamp for the flaming of tubes and pipettes and some simple means of preventing dust infection, if one has a supply of sterile media and sterile pipettes. These cultures, after all, supply us with the most essential data as to pollution. The later confirmatory work can and must be done at the laboratory.

If we find that every cubic centimeter of the water or a majority of several one cubic centimeter portions of a particular well or spring gives fermentation and marked gas formation in lactose bile and dextrose broth, we may be reasonably sure that pollution organisms of the colon type are present, although it must be admitted that there are bacteria which will ferment these culture media which do not belong to the colon group. They are, however, relatively rare and probably are in themselves, for the most part, quite as objectionable as the colon bacilli. For practical purposes, therefore, our presumptive tests may be still regarded as unimpaired, and the above dictum as to the significance of results will generally, but not always, stand.

If one wishes to go somewhat further and use fractions of a cubic centimeter of the water in question, of course the tests can be made with even greater accuracy as to the approximate number of the undesirable fermenting types. By carrying sterilized agar about in bottles it is not a difficult matter to make plate cultures as well, and these can be taken at night to the laboratory, if it is within reasonable distance, for incubation, or a temporary incubator can be installed at some central point while the water supplies of a particular district are being studied. Where ever it is possible, however, the examination should be carried out with greater thoroughness; the actual counts on agar at 20° and 37° and on litmus lactose agar should be obtained. Wherever possible, in my opinion, the laboratory examination should supplant the field determination because of the greater strictness with which we can avoid contamination from the air and from other sources. Field work, however valuable, is always of course subject to some error from this source.

In the examination of dairy farm water supplies we have found it of advantage to obtain certain data, and for purposes of filing it is convenient to have this information recorded upon some standard form of card. A form which would be used in this laboratory in any extended investigation would be somewhat as follows:

FROM WATER SUPPLY INSPECTION

Name of tenant........................

No. of persons in family..................

Children, servants or laborers............

General health of family.................

Source of water, well, spring, etc.........

Depth, if well.........................

Distance of source from house drain (a)....

Distance from cesspool or privy (b).......

Distance from barnyard (c)...............

Position as regards drainage from

a. ....

b. ....

c. ....

Surface wash?........................

Immediate surroundings.................

Protection against contamination from cattle, manured fields, etc..............

Covering, if any.......................

Date...................

Town and State.......................

Water piped to house?..................

Water piped to barn?....................

Character of tank, if any................

Kind of pipe..........................

General character of soil................

If well, when last cleaned................

General appearance of farm surroundings ....

Is water used for cooling milk or food?......

Sample taken at.......................

Analytical Data.

20° C. count..........................

37° C. count..........................

Litmus Lactose Agar count..............

Acid formers..........................

Presumptive test, dextrose broth..........

Presumptive test, lactose bile............

B. Coli...............................

Remarks:............................

Examination by the writer of the water supplies of 202 dairy farms situated between twenty-five and forty miles from Boston have yielded results which are of much interest in showing actual conditions likely to be met in a long-settled, intelligent and well-inspected region, probably rather superior hygienically to the rural districts of most of the country. Of these 202 farm water supplies, twenty-nine, or 14.4 per cent.; were shown to be badly polluted, either from privies or from some other sources, so that the water was unfit for use as a drinking water or for domestic purposes, or for the washing of milk utensils, pails, cans, strainers, etc., purposes to which these waters had been put. In addition to the foregoing, ten gave evidence that the danger of contamination was immediate, although the analysis showed in each case that intestinal types of organisms were not actually present in the water. In some instances these were wells located in the barnyard and hence likely to receive pollution with a heavy rainfall by the influx of polluting surface material, or they were in too close proximity to sink-drains, privies or some other dangerous source. It is, of course, possible with good filtering material, such as a fine sand, that a well may be within a very short distance of such sources of contamination for a long time without actual pollution taking place, but it must be borne in mind that such a state is not satisfactory. Conditions might arise by which this slender barrier would be broken down, hence it is very desirable that the protecting layer of material between any of these common sources of contamination and the water itself should be as strong and resistant as possible. For practical purposes, therefore, thirty-nine wells out of 202 were condemned as either being actually polluted with intestinal organisms or in danger of pollution at any time. Practically, then, one fifth of the wells of a portion of the country, well above the average, were found to be of this undesirable character.

In the following table the principal bacteriological data are given, viz., the 20° count, the 37° count on litmus lactose agar and the acid forming colonies as well as the results of the presumptive tests with dextrose broth and lactose bile. In expressing the results of the presumptive tests, a positive result, indicated by a plus sign (+), means that a majority of one cubic centimeter portions of the water in a series of five or more tubes have given gas to the amount of 30 per cent. or more in twenty-four hours at 37° C. Positives were not subjected to confirmatory tests in all cases but the results obtained here and elsewhere have led the writer to believe that when the results indicated above are obtained it is almost indisputable evidence of pollution by intestinal types of organisms.

Twenty of the farms examined were supplied with water from the public systems of two towns and in only two cases was there any evidence of contamination, so it has been thought unnecessary to tabulate these results.

A survey of the figures both for wells and springs shows great variation in the number of bacteria developing at room temperature and seem to offer conclusive evidence that, except in cases where the figures are enormous, the room temperature count is practically without value as a basis for judging the sanitary character of a water. This is shown in well No. 132, where with a total count of but 90, pollution was proved, and again in well No. 140, where, with a total count of but 20, pollution was shown. On the other hand, wells numbered 29 and 36 with 2,000 and 1,850 respectively, and spring No. 17 with 6,000 proved to be absolutely free from intestinal organisms.

It should be pointed out that the relation between the 20° count on gelatin and the 37° count on litmus lactose agar is somewhat different from that existing between the 20° and 37° count on ordinary nutrient agar, as the lactose medium seems to have a somewhat inhibiting action for certain kinds of bacteria.

It may also be noted that in some instances the presumptive tests have revealed the presence of fermenting intestinal organisms which would have been entirely overlooked by the use of the litmus lactose agar plate alone. In fact, it may be assumed that the latter medium is far from satisfactory as a presumptive test and gives but little aid in detecting pollution in small amounts.

The presence of considerable numbers of bacteria in shallow wells is to be expected from our knowledge of soil bacteriology. It is only when the water comes from considerable depths or when the soil is a sand with little organic matter that we may expect to find the numbers of bacteria very

BACTERIOLOGICAL EXAMINATION OF SHALLOW WELLS.—TABLE I.

Water supply number.	20° C. count.	Litmus lactose agar, 37° C.	Acid formers.
1	1	0	0
2	55	4	2
3	12	0	0
4	0	0	0
5	245	22	0
6	60	10	0
7	37	2	0
8	15	1	0
9	102	7	0
10	13	5	0
11	288	2	0
12	24	1	0
13	665	22	0
14	375	. .	0
15	113	2	0
16	40	1	0
17	43	2	0
18	3	1	0
19	17	2	0
20	515	3	0
21	2	1	0
22	75	5	0
23	45	2	0
24	125	12	0
25	215	1	0
26	60	1	0
27	125	17	0
28	47	13	0
29	2000	3	1
30	0	0	0
31	255	5	0
32	42	1	0
33	25	2	0
34	82	2	1
35	8	0	0
36	1850	25	1
37	145	2	0
38	10	2	0
39	115	2	0
40	. .	3	0
41	12	2	0
42	. .	100	0
43	. .	6	0
44	30	0	0
45	10	0	0
46	15	0	0
47	10	. .	0
48	25	9	0
49	20	. .	0
50	45	. .	0
51	50	5	0
52	16	3	0
53	150	0	0
54	15	3	0
55	liquefied	5	0
56	"	1	0
57	75	2	0
58	800	10	0
59	250	2	0
60	390	21	0
61	5	2	0
62	60	15	0
63	350	38	0
64	85	2	0
65	liquefied	6	0
66	196	1	0
67	53	40	0
68	140	3	1
69	9	0	0
70	140	2	0
71	12	1	0
72	200	3	0
73	19	1	0
74	165	0	0
75	312	1	0
76	1015	3	0
77	105	17	0
78	1	0	0
79	13	7	0
80	416	0	1
81	13	2	0
82	370	3	0
83	49	1	0
84	450	1	0
85	300	1	0
86	415	6	0
87	800	10	0
88	196	0	0
89	1200	4	0
90	6	0	1
91	340	8	0
92	390	21	14
93	liquefied	24	0
94	60	10	0
95	liquefied	19	0
96	2	1	0
97	190	0	0
98	100	4	0
99	4	2	1
100	165	6	0
101	60	20	2
102	. .	20	2
103	. .	34	0
104	50	6	0
105	50	1	0
106	130	5	0
107	600	14	8 weak
108	60	12	0
109	625	165	0
110	45	10	15
111	36	5	1
112	2	3	0
113	16	3	0
114	37	1	0
115	20	25	0
116	0	0	0
117	10	1	0
118	2	3	0
119	8	1	0
120	7	1	0
121	12	0	0
122	125	37	0
123	385	26	0
124	1200	4	0
Presumptive tests of samples 1 to 124 all negative.			
125	141	24	7
126	1950	675	11
127	120	13	8
128	3000	11	3
129	440	28	6
130	1100	19	6
131	225	31	28
132	90	13	1
133	2000	215	37
134	. .	35	10
135	143	12	7
136	. .	48	0
137	425	13	0
138	126	6	1
139	600	30	6
140	20	2	1
141	74	2	0
142	145	7	3
143	550	65	20
144	122	5	0
145	125	2	0
146	425	13	0
147	134	2	0

Presumptive tests of samples 125 to 147 all positive.

small. Unfortunately, owing to lack of data as to depth, we are unable to correlate the depths of the wells here studied with numbers of bacteria found.

In the case of springs, on the other hand, we might expect to find very low numbers of bacteria owing to the deep seating of the source of the water. It commonly happens, however, that the spring on breaking through the surface really becomes a surface pool and as such provides a favorable place for the development in considerable numbers of such organisms as Pseudomonas fluorescens, B. aquatilis, etc., so that these may frequently be found in almost pure culture. Examples of this sort are shown in supply Nos. 5, 17 and 41.

BACTERIOLOGICAL EXAMINATION OF SPRINGS.

Water supply number.	20° count.	Litmus lactose agar, 37°.	Acid formers.
1	175	7	0
2	43	2	0
3	21	1	0
4	286	11	0
5	950	0	0
6	207	0	0
7	28	7	1
8	4	2	0
9	175	7	0
10	25	4	0
11	5	2	0
12	24	2	0
13	36	6	0
14	. .	2	0
15	10	0	0
16	20	5	0
17	6000	5	0
18	liquefied	23	0
19	“	5	0
20	30	2	0
21	100	20	0
22	5	1	0
23	45	20	0
24	liquefied	0	0
25	“	3	0
26	75	5	0
27	few	0	0
28	liquefied	0	0
29	8	0	0
30	63	0	0
31	10	0	0
32	175	21	0
33	0	0	0
34	226	18	0
35	2	0	0
36	300	50	0
37	171	105	7
38	liquefied	500	. .
39	“	48	1
40	many	95	8
41	2040	31	4
42	. .	80	5

Presumptive tests of samples 1 to 36 negative and samples 37 to 42 positive.

In case of polluted wells, the filth which constitutes the contaminating substance may gain entrance from surface wash or through cracks in the upper part of the well casing, or by cracks in the planking or other covering. Another possible method is by pollution of the bucket. The ordinary well bucket is handled by many hands and these are frequently not clean. If a person with filthy hands draws water and handles the bucket, rope or chain, the material deposited on these may gain immediate access to the well, and thus indirectly be carried from the hands of the infected person to the mouths of others who drink water from the well. When we bear in mind the possibilities of germ carriers such as typhoid carriers, etc., this becomes a serious matter.

The bacteriological methods of examination historically followed the chemical methods of examination in development, but their directness and accuracy have, in my opinion, made bacteriological water analyses of far greater value than the chemical analyses can be.

As to what may be done to reduce the chances of infection of a farm water supply, I should recommend the following procedures:

1. Guard against contamination with human fecal matter by providing a sanitary privy in cases where water closets and well constructed cesspools are lacking.

2. See that the casing of the well is of suitable material, is tight and extends for at least a foot above the surrounding surface. It is of advantage to have it made of clay or cement to be impermeable.

3. Provide a tight top or platform so that the water cannot drip through the cracks carrying contamination from dirty boots.

4. Replace the bucket by a pump when this can be advantageously done. When it cannot, use a bucket requiring as little handling as possible or an automatic one.

5. See that the position of the well is not in the direction of the natural drainage from barnyard, sink-drain, or privy. If within 40 feet of these be sure that the soil is of good filtering material, sand, etc., and free from fissures and easy by-passes for the surface water to enter the well.

If these precautions are observed and all filth of every description is vigorously excluded, one may feel confident that the water supply will be safe and wholesome.

CITY LIFE IN RELATION TO TUBERCULOSIS. A PLEA FOR BETTER SURROUNDINGS FOR FACTORIES AND BETTER HOMES FOR THE WORKING CLASSES.

Isaac W. Brewer, M. D.

Tuberculosis has been called the "Universal disease" because it prevails in all portions of the globe and effects all classes of society. It is, however, less prevalent in the arid regions, and the well-to-do suffer less than the poor who are crowded into tenements in our large cities.

Until the latter part of the nineteenth century the attitude of the general public and of the medical profession towards consumption was one of despair, the disease being considered incurable. Most of the efforts of the physician were expended in making his patient comfortable and practically nothing was done to prevent the disease. There were, however, men who held other views and who endeavored to cure the disease. As early as 1840 George Boddington of Warwichshire, England, wrote an essay "On the Cure of Pulmonary Consumption on Principles Natural, Rational and Successful," in which he advocated life in the fresh air under medical supervision, with an abundance of food. He insisted that cold never injured the patient. He established a sanatorium for the treatment of the disease according to his views but so great was the opposition that it had to be abandoned.

In 1856 Herman Brehmer advanced similar views in a thesis for his doctor's degree and three years later, in the face of great opposition, opened at Gördersdorf, the first successful sanatorium for the treatment of the disease.

The work of these men and their followers was like a single candle flickering in the darkness which obscured the professional view regarding tuberculosis. Nevertheless the flame was kept burning and was fanned into a bright blaze in 1882 when Koch announced that tuberculosis is caused by a germ which is to be found in the expectoration of those suffering from consumption. This was the beginning of a new epoch in the treatment and prevention of the disease. With a knowledge of the cause it would be possible to prevent it to a certain extent. Despair has given place to hope and optimism which means conquest of the "Great White Plague" or at least a great reduction in its ravages.

Today the entire world is organized to combat tuberculosis. Thousands of men and women in all portions of the globe are enrolled in the great campaign against it; they are giving their time and money to the cause and yet it seems that most of the energy is being expended in overcoming the results of the disease rather than in removing the cause.

To successfully combat any disease we must know the cause and the mode of its transmission from person to person, and must remove the cause and close the channels of transmission.

The causes of disease may be divided into exciting (direct) and predisposing (indirect).

The direct cause of tuberculosis is a bacillus which is found in the expectoration and other discharges of those who have the disease, depending upon the location of the infection. It is also found in the milk of cows which have the disease, and in the flesh of tubercular cattle, hogs and other animals. The dust in our houses and that of the public streets contains many of these germs. Probably every one of us breathes or swallows a large number of tubercular bacilli every day, but nature has provided the healthy body with means of overcoming this invading host or no one would escape the disease.

The indirect causes are impure air, lack of sunshine, dampness, overcrowding, dissipation in any form, working in a dust-laden air, poor food, the sweat shop and the tenement. These lower the vitality of the body so that the tissues are no longer able to overcome the invading bacilli and so the body beomes infected. These causes operate more actively in the great centers of population than in the sparsely inhabited districts.

Tuberculosis can be transmitted to man through the medium of infected milk or food, but more especially by the inhalation of the germs in the minute droplets of mucous which are expelled from the mouth during the act of coughing. The breath of a consumptive is in no way a danger to the community or those with whom he associates.

Dr. L. F. Fleck (1) in a recent paper gives the following as the essentials in the crusade against tuberculosis:

1. Control of infection.
2. Disinfection.
3. Life in the open.
4. Proper food.

In the great campaign, which has enlisted so many enthusiastic workers, and which is rendering such service to mankind, attention has been directed largely to the first and second of the above propositions, and the question of procuring better food and pure air for the poorer of our people has not received the attention that its importance demands.

In this paper it is not intended to consider the prevention of the disease in all of its phases, but rather to dwell upon environment as a cause, for unless we, in our endeavors to combat tuberculosis, make radical improvements in the housing and feeding of the less fortunate of our fellow beings we will accomplish no lasting benefit to the nation nor to those who are exposed to the disease. Should we be so fortunate as to reduce the ravages of tuberculosis to the insignificant number now claimed by small pox, some other disease would take its place. Pneumonia is already a strong candidate for the position of "Captain of Death."

The following table shows the death rate per 100,000 from tuberculosis of the lungs in the urban and rural districts of the registration area of the United States as shown by the returns of the Census Bureau for the ten years ending with 1909:

	Urban.	Rural.
Connecticut,	156	117
Indiana,	174	148
Maine,	162	128
Massachusetts,	162	157
Michigan,	100	80
New Hampshire,	146	122
New Jersey,	183	128
New York,	194	124
Rhode Island,	181	155
Vermont,	144	126

Not only is the death rate from tuberculosis greater in the cities but the reports of the Census Bureau show that for the ten years ending with 1909 the death rate from all causes was higher in the cities than in the rural districts, the rates being 17.0 per thousand in the cities and 13.8 in the rural districts. There are a few diseases which are more prevalent in the rural districts, the principal one being typhoid fever.

Dr. E. E. Graham of Philadelphia, in an elaborate study of the infant mortality states (23) that epidemic diarrhea (the principle cause of death in young children) is a disease of large towns and cities.

We have seen that disease and especially tuberculosis is more prevalent in cities; let us see if there is anything in the city air that may help to account for this. Observations taken in Paris have shown (11) that there are on an average 4,790 bacteria to the cubic meter of air in the center of the city, while at the Observatory of Montsouris in the suburbs there are but 345 per meter.

Aitkins (12) found the average number of dust particles per cubic inch of air in the country to vary from 8,000 to 100,000 while in the city the figures were found to be from 1,000,000 to 50,000,000. The dust in the air of cities is largely composed of soot. It has been estimated that London burns about 30,000 tons of coal per day and generates therefrom 300 tons of soot.

Dr. J. B. Cohen, speaking of smoke producers, says (14): "The smoke banners which fly from their chimneys are the black flags of piracy. They are pirating the pure air which is the property of every one."

The dust and smoke in the atmosphere has a direct effect upon the lungs of those who breathe it. Autopsies have shown that the lungs of the dwellers of cities are darker than those of persons who reside in the country. This difference is due to the deposit of carbon (soot) in the tissues surrounding the air cells. In time this lowers the vitality of the tissues and so predisposes to tuberculosis and other diseases.

Laboratory studies have shown that the condensation of vapor takes place very slowly in a dust-free atmosphere even though the temperature be reduced far below the point of condensation. A certain number of dust particles appear to be necessary to furnish nuclei around which the condensation takes place. The conditions which obtain in the atmosphere of our large cities is exactly the opposite from the dustless chamber of the experimentor and the smoke and dust are largely responsible for the mantle of fog which hangs over so many large cities. In London the number of days of fog has increased from 51 during the five years ending with 1875, to 74 during the five years ending with 1890 (13).

There is also a chemical difference between city and country air. Angus Smith examining the air in Dundee at night found the carbon dioxid in the center of the city to amount to 0.042, while in the suburbs at the same time the amount was 0.028. Burning coal not only produces soot but also generates sulphurous gases which, combining with the watery vapor in the air, makes acids which irritate the mucous membrane of the breathing apparatus, and also destroy the stone and iron work of buildings. The air in the town of Leeds, England, was found to contain 11.6 milligrams of $S.O^3$ per 100 cubic feet of air, while in the outskirts the amount was 5.5 milligrams (12).

In large cities there is always more or less pollution of the air by illuminating gas. In London, during six months of 1908, 110,000,000 cubic feet of gas leaked from the mains (16). This contains carbon monoxid which is highly poisonous.

It is said that "Buffalo Bill" was struck with the resemblance between the streets of New York and the cañons of the West, and is said to have first called Broadway, "Broadway Cañon." He was not far from right for there is but a difference in name; both have precipitous walls which exclude the sunlight, and from a sanitary point of view the cañon is the better of the two. Sanitation requires that no building should be higher than the width of the street on which it is situated, but in most American cities a much greater height is allowed, and in New York and other of the larger cities there is no limit to the height of buildings.

In this respect we are certainly far behind the cities of Europe where there are strict regulations limiting the height of buildings. There is, however, a movement on foot in New York to have such regulations enacted, but one of the most influential papers in the country is actively opposing it. One of the greatest objections to tall buildings is that they cut off the sunshine from the streets and from the opposite houses. Sunshine is one of the most efficient disinfectants and the lack of sunshine is one of the factors which causes the increased mortality in large cities.

There is a great difference between the amount of sunshine in the city and that of the suburbs. The average number of hours of sunshine for the year in London is 1,026, at Greenwich it is 1,227, and at Kew just outside the city the number is 1,399.

The death rate increases with the density of the population which is shown by the following table which Kober (4) of Washington quotes from Rohe:

	Mean number of inhabitants to each home.	Average annual death rate per 1,000 inhabitants.
London,	6	24
Berlin,	32	25
Paris,	35	28
St Petersburg,	52	41
Vienna,	55	47

Kober also states (17) that in certain cities in Europe there are laws fixing the maximum density of population. Such laws would be most beneficial in this country.

Tuberculosis is largely a house disease of the large cities, and is more prevalent where people are crowded together in badly ventilated buildings. In New York state the incidence of the disease in large cities is twice as great as in the rural districts.

Lilian Brandt, who has analyzed the statistics of tuberculosis for the Charity Organization of New York City, says (18): "All those occupations with a noticeably high mortality from consumption belong primarily to the cities and large towns, while among those with a consumption death rate below the average of 2.4 per 1,000 are found almost all that are carried on in small towns or the country." She also presents the following table which shows the death rate from consumption per 1,000 according to occupation (24):

Occupation.	Death rate.
Laboring and servants,	3.8
Clerical and office,	3.0
Public entertainment,	2.7
Manufacturing and mechanical pursuits,	2.6
Personal service, police and military,	2.5
Professional,	1.8
Mercantile and trading,	1.7
Agriculture, transportation and other outdoor pursuits.	1.5

Dr. R. H. Babcock of Chicago says (2): "Brave-hearted, philanthropic men and women are battling against this terrible disease (tubersulosis), but their efforts will be in vain as long as the vile tenements and sweat shops are tolerated in our midst."

Dr. John R. Walker (3), who has made a study of tuberculosis amongst the Oglalla Sioux Indians has shown that the Indians suffered but little from tuberculosis while living in tepees, but that the mortality began to increase as soon as they built houses. The difference being that the tepees were better ventilated and were moved as soon as the ground became filthy, while the houses are badly ventilated and soon become filthy, but cannot be moved.

Dr. S. A. Knopf (5) estimates that in 1900 over seventeen millions of the American people were engaged in indoor occupations, and that counting all the time spent indoors the greater part of the people pass their lives indoors.

If these statements be true, and there is no reason for believing otherwise, it would seem that the question of housing should be of the greatest importance in the prevention of tuberculosis.

The housing of the working classes in our large cities is a disgrace to the nation. Crowded into tenements where the streets are narrow and badly kept, a large number of them occupying rooms that are badly ventilated or without ventilation, many of which are entirely dark, they live in the most favorable environment for the development of tuberculosis.

Not a few of our people think the housing problem has been settled and that with the Tenement House Commission, and the Factory Inspectors, all that can be done is being done. A careful study of the subject will convince at once that, although these agencies have done much, there is much more to be done. In New York City there are 356,000 dark rooms without windows which are occupied by more than 300,000 persons. There are also in the largest city in our country several thousand open sink privies in the tenement house district. These conditions are being remedied very slowly and at the present rate it will be over fifty years before all the dark rooms in New York are abolished.

The Committee on Congestion of Population (New York) found (7) that in one block in the lower portion of the city 34 per cent. of the families occupied two rooms and that 18 per cent. occupied one room. One sixth of the rooms in the block housed four adults. The great majority of the families were paying 25 per cent. of their income for rent and some paid more than 50 per cent.

Dr. Antonio Stella (7), investigating the condition of the Italian population of the city of New York, says: "On Third Avenue, near Twenty-sixth street, a family of eleven—four adults and seven children—and three clerks were living in a dark middle room, and a large bare rear room, an average of seven people to the room. In the section of the Bronx, bounded by East 148th and 153d Streets, Morris, Courtlandt and Park Avenues, I found some of the very worst conditions. In a rag shop on Morris Avenue there were no less than eighteen people, men and women, working, eating, and sometimes sleeping in a double, new-law tenement. In this section I found 1,100 people, divided in 130 apartments not counting all the night lodgers."

Such crowding of persons of both sexes is not only insanitary but degrading and Doctor Stella has called attention to the rapid spread of venereal disease amongst these people. According to his observations many of those infected are innocent of any crime, the disease being contracted through sleeping in the beds that have been occupied by infected persons or by using their linen or towels.

Doctor Stella says that the Italian children of New York City are not as robust as those brought up in the rural districts and that the proportion of the Italian recruits rejected in New York City is greater than in Italy. Many of the Italian women born in New York are sterile. All of these defects he attributes to bad housing and lack of proper food.

The late Professor Harrington of the Massachusetts Board of Health said (22): "It is well known that a large percentage of the deaths among people whose working days are spent within the walls of industrial establishments is due to consumption." Statistics from the Henry Phipps Institute of Philadelphia show that "houseworkers, mill workers, factory workers, cigar makers and weavers supply vastly the majority of cases" of *tuberculosis.*

Such persons are poorly paid and work long hours in factories which are generally badly lighted and poorly ventilated, and in many cases after the day's work is over spend their leisure and sleep in much worse surroundings. It is but natural that such persons should resort to the saloons which are warm and brilliantly lighted, where there is company, and they are welcome as long as they spend something. Such a life predisposes to tuberculosis and if the disease is to be eradicated particular attention must be paid to this class of persons and the sanitary condition of their homes and working places must be improved. How best to do this is a question which should receive the careful consideration of every factory owner.

The average duration of a case of tuberculosis is about two years, during which time the work turned out is not up to the standard so that the disease causes a loss to the employer as well as to the employee.

There have been many honest efforts to better the condition under which the working population is housed. About ten years ago a number of citizens of Washington organized the Washington Sanitary Improvement Company for the purpose of constructing homes for the working classes of the National Capital. They adopted the two-family house plan, one apartment above the other, each having a separate entrance, bath, toilet, and yard. The rents were so arranged that after deducting operating expenses there would be a 5 per cent. dividend. So far they have constructed two hundred houses, all of which are rented. A novel feature of their plan is to allow the tenant all of the twelfth month's rent that is not required for repairs. This insures permanence of tenants and a minimum of damage to the property. During the year ending March, 1906, the apartments were occupied by 778 adults, and 380 children, a total of 1,158 persons. There were 39 births and 8 deaths, a death rate of about seven per thousand, while the general death rate amongst the whites of the city was 15 per thousand.

In our campaign against tuberculosis and other diseases we have, to a large extent, adopted the "soup-house" plan. Free medical treatment and free food and clothing can be had in almost any city, but fresh air is not to be had in many of our cities. Dr. L. R. Williams (6) is authority for the statement that there are about 800,000 persons in New York City who never escape beyond the confines of the city. In 1903 over thirty-three thousand persons were sent out of the city for seven days' fresh air.

It is my opinion that the only way we can make any permanent headway against tuberculosis is to scatter the population that is now congested in the large cities. This can only be done by removing the establishments in which they work to the rural districts. I am well aware that this is a radical departure and in direct opposition to the trend of business and that it is often difficult for factories situated in the rural districts to obtain workmen. There are, no doubt, other disadvantages, but to offset them are the lower rentals, cheaper land, lower taxes, and greater and above all the saving of human life.

This is not a matter for the factory owner alone, but also one in which the workmen should coöperate. The labor unions should use their influence to induce workmen to avail themselves of the opportunity for living in the country and the labor leaders should endeavor to supply the factories that are situated in the rural districts with the most skilful and reliable workmen. Despite what may be said to the contrary, I am convinced that there is no valid reason why a large majority of the factories in New York City and other cities should not be moved out into the surrounding country. Move the factory to the country where the workers can be well housed in cottages, where he can have flowers and vegetables in his yard and above all where his children can have pure air and grow up amidst the green grass and the trees. Here there will be fewer temptations and better citizens will be produced.

The ideal factory from a sanitary standpoint would be located in the midst of a park, surrounded by trees, through which should run wide streets lined with the cottages of the workmen. This may not appeal to the average employer and many will say that it would not pay. One manufacturer, whose friendship I prize highly and who has made a business success by his own efforts, tells me that such a movement would be a failure, that the trend of business is towards the cities. Yet, I believe, that the same spirit which made him succeed in his business in the city would have made him successful under the conditions which obtain in the country. A great deal of the manufacturing in New England is done in the small country places.

The success of the Sanitary Improvement Company in Washington has shown that there is money to be made in housing working people in good buildings and this will add not a little to the receipts of the factory which moves to the country.

Prof. J. Van Pelt, an architect of New York (10), has planned a cement cottage of eight rooms for working people, which can be built for $3,000. To net 6 per cent. this would have to rent for $15 per month, which would allow 4 per cent for dividends and 2 per cent. for sinking fund and repairs. If the Washington plan of remitting all of the twelfth month's rent not required for repairs were adopted the damage to the houses would be very small.

It is true that there is a steady stream of men and women from the rural districts pouring into the great cities. They leave their homes to escape the monotony of country life and because they have before them the example of other country-bred men and women who have been successful in the great centers of population. Some do, indeed, become great and many of the greatest of our citizens have come from the country districts, but the great majority of these emigrants will be lost in the maddening rush of the city life and never attain anything at all.

Dr. F. A. R. Russell of London (19) is authority for the following statement: "As a matter of fact, it has been ascertained that very few families survive in central London for more than four generations, and many die out in three generations. A true Londoner of the fifth or even the fourth generation is rare. A large proportion, probably the majority, lose the fine stock of health they brought with them from the country within two generations."

Each year a few of the city dwellers move to the country. They are mostly men in advanced years who have been successful in life but who find the confinement of the city too much for them and move to the freer life of the country. The editor of *American Medicine*, discussing the question of the location of colleges, says, "City life is very deadly to the young," and advises that colleges be located in the country saying, "Send the boys out of the city." President C. W. Eliot of Harvard University is authority for the statement that many schools are springing up on the outskirts of our great cities, that draw their patronage from the dwellers of the city who have found that it is impossible to obtain proper healthy surroundings for their children in the large cities.

Hon. Charles E. Hughes, governor of New York, says (20): "The man who regards with sullen indifference the congested life in our great city, who is content to pleasantly wrap himself in the garments of prosperity and think of his fellow creatures as ignorant and disorderly masses with whom he has nothing in common, has but small right to pride himself upon the valor of his Revolutionary ancestors or talk of his patriotic devotion to his country."

Those who do not agree with me regarding the necessity of moving the population from the congested districts will at once call to mind the large parks recently established in many of our cities. To them it will seem that these breathing places are ample for the people, but they are not. In the first place there are too few of them and the air is the same polluted mixture that is to be had in the surrounding streets. Another objection is the "Keep off the grass" signs. I now have in mind a large park in one of the eastern cities which, in the days I first knew it, was a bare common always filled with children. It looked bad to the æsthetic eye and the recent movement to beautify the city has caused it to be planted with grass and shrubs and provided with winding walks, but alas, the playground of the children is gone, and they must stay on the walks.

If the city air is good why do we send out children to school in the country, and why do we leave the city in the summer for a sojourn at the seashore or in the country? If you wish to test this question spend July, August and September in New York City. Take a room in a small hotel or boarding house on a side street, and spend the evenings walking through the region east of the Bowery. It will be a lesson that will never be forgotten. There you will see a mass of human beings filling the streets and sitting on the steps gasping for a breath of fresh air. More than once will the cough of the consumptive attract the attention and you will hear the cry, "Breath—breath—give me breath," uttered by some person in the last agony of tuberculosis.

This is an appeal to the patriotic citizens of the country, the employer of labor, to the laborer, and to those who obtain their living by the labor of others to do what they can to better the condition of the workmen of the country, especially those who are unskilled. This is a patriotic duty. Under the present conditions we are rearing a race of degenerates who will some day make trouble for the country, besides many innocent persons are being murdered by the foul air and the bad food they obtain in our large cities. We are becoming a very patriotic people in that we have many societies which commemorate the deeds of our forefathers. In all of the older cities there are many tablets marking spots sacred in the history of the country. Boston is literally placarded with them. All this is solemn mockery when within sight of these inspiring monuments there are thousands who are being starved, and degraded by our greed for riches and the comforts which they can bring us.

I ask the readers who are owners of stock in business enterprises to learn something of how the workers in the business are living. Use your influence to obtain for them shorter hours, better surroundings, and a fair share of the profits of their work. Do this and you will be helping to eradicate the "Great White Plague." Such a policy may reduce the dividends of the company but you can made it up by saving what you have been giving to charity and to educate the heathen. Help to make our people independent, and strive to prevent them from becoming pauperized by accepting charity.

Those who are in business for self remember that you are the guardians of the health of those who toil for you and take a real interest in their physical welfare. Be liberal with their allowance of vacation. If your children need three months in the country and you find it necessary to spend the summer in the suburbs how much more do your employees and their children who live in the crowded portions of the city need a vacation. When you see one of your employees looking badly give him a vacation and if needs be turn a deaf ear to the man who asks your aid for foreign missions.

I have before me an appeal from an officer of the army calling upon the American people to vote more money for guns and soldiers to provide for a remote possibility of war. If these are needed let them be forthcoming, but also let us have liberal appropriations and laws with which to combat the enemy (tuberculosis), which is now in our midst and is destroying over two hundred thousand of our citizens each year. Tuberculosis is sapping the strength of the nation and the conditions which predispose to it, and against which I ask your united efforts, are also those which predispose to crime and degeneration. No nation can continue unless its citizens are strong, healthy, and clean in body and mind. Ruskin says: "The strength of the nation is in its multitude, not its territory; but only in its sound multitude." Guns and warships are valueless unless manned by men of brains and strong muscles. The weakling will find no place in our military or commercial warfare. Therefore, let us build up the race by removing the causes of degeneration so that our citizens may be able to fulfil any demands made upon them. I believe that the prevention of disease, especially of tuberculosis, is a national duty and comes within the meaning of the portion of the Constitution which says "to provide for the common defense."

The purpose of this paper is not to condemn any one but rather to ask your coöperation in the endeavor to eradicate the "Great White Plague."

The ills from which the country suffers are not to be charged to any one person or any group of persons but rather to the whole people, for they alone are responsible for the laws under which we live and for their inforcement.

This is a plea for charity, morality and temperance in the highest sense that these terms can be used.

Charity which has not fulfilled its mission by giving food and cast-off clothing to the less fortunate, but a charity which strives to make our people independent of the "soup kitchen" and the relief station.

Morality which goes beyond our own selfishness and aims at the uplifting of the degraded by providing them better environment and by removing the cause of their degradation and accomplishes results, not by the enactment of laws with penalty clauses attached, but by the education of the people to do what is right because it is right.

Temperance which goes beyond the question of drink, and aids us to use moderation in all things, especially in eating, drinking and in dressing. Many who do not drink to excess are intemperate in their food and dress. It is just as bad to pay an excessive price for a hat or a coat or a dinner as it is to drink or eat more than is good for us. Many and many a man and woman has been ruined by extravagance.

For the sake of humanity let us stop this extravagance which makes so many live beyond their means, and which causes a continual war between the employee and the employer, which beats down wages and runs up prices and swells the mortality bills from tuberculosis.

Each of us has his part in the great crusade against tuberculosis, depending in magnitude upon our social and financial standing, but there is something for each one to do.

Let us bring into this work the "Spirit of Christmas, Peace on earth good will towards men." A spirit which will make us a happy nation and will abolish the slums and banish tuberculosis from our land.

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THE RELATION OF WATER TO CHRONIC INTESTINAL TRACT INFECTION.

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One of the common if not the most common result of chronic intestinal tract infection is auto-intoxication. It is not the purpose of the authors to present a history of auto-intoxication, but rather to outline its effect upon the body and to suggest that one cause of auto-intoxication may be the constant drinking of impure water. If this hypothesis is true, then we have found one rational explanation for the increased human resistivity following the substitution of a pure water for a polluted water and, therefore, the cause for the decrease in the general death rate following such a change.

The symptomology of auto-intoxication which is presented here is drawn largely from the works of Mechinkoff, Dr. A. Combe of the University of Lausanne, Switzerland, and Dr. C. A. Herter of Columbia University, New York City.

Auto-Intoxication and its Effect on the General Health.

Dr. Combe defines intestinal auto-intoxication as the toxæmia caused by qualitative or quantitative alterations in a normal digestion. By normal digestion is meant the digestion of a normal man produced by the enzymes or bacteria in the stomach and intestines. Auto-intoxication may also be defined as a toxæmia caused by poisonous substances which are formed through the influence of the vital processes of the body. Such substances are termed "toxic substances" or "toxic compounds."

The digestive enzymes present in the stomach and intestines during the process of digestion convert starch into sugar, emulsify fats, and transform nitrogenous material into albumen, peptones and crystalline bodies. There are some bacteria usually present in the intestines which are also capable of doing the same things. As Doctor Combe points out, it is this constant intervention of the bacteria in the process of digestion that permits us to consider it a normal process of the body. Certain classes of bacteria perform a legitimate function in the process of digestion, and while their presence may not be absolutely necessary, yet under normal conditions their presence is at least not detrimental. Under certain conditions, however, the bacterial action is extended to the production of hydrogen sulfide, lactic, butyric, propionic acids, indol, skatol, phenol, paracresol and other substances derived from the processes of fermentation and putrefaction. These compounds may be produced by the introduction of bacteria not normal to the intestines, but which, when planted there, gain a firm lodgment and carry on the work of putrefaction. The toxic compounds may also be increased by an increase in the number of bacteria normal to the intestine. In fact, any bacterial condition in which the number, varieties and microbic associations overbalance those influences provided by nature to prevent the formation of toxic substances detrimental to the human organism may produce auto-intoxication.

The substances introduced as food into the alimentary canal which are most susceptible to putrefaction are the highly nitrogenous compounds. It is the aromatic bodies produced by the action of bacteria upon these proteid matters which cause auto-intoxication. These products, some of them but slightly poisonous individually and in the quantities normally present, when present in excessive quantities produce the most deleterious effects upon the human system. Fortunately, the body is capable of gradually accustoming itself to the presence of these toxic substances and even organizes means of defense against them.

The ability of the human organism to adjust itself to the presense of toxic substances derived from the intestines is limited, and it may be overcome by the formation of excessive quantities of the toxic compounds. It is also impaired by other means, such as a severe cold, by overwork, or by some disturbance of the nervous system. It also varies greatly with the individual. Some people can apparently eat anything and drink everything and still escape the penalty imposed by nature. Others lose the defensive power on the slightest provocation. A child is much more susceptible to auto-intoxication than an adult, as is instanced by the severe cases of auto-intoxication in children, following slight diatetic indiscretions on the part of the nursing mother, or the change of food of a cow from dry feed to green fodder. In fact, any condition which tends to exceed the adjusting power of the body causes auto-intoxication.

The kind of bacteria in the intestines depends largely upon the nature of the food. If the diet consists largely of milk, as in the case of young children, the flora of the intestines will be very nearly that of the milk, and will consist of very few varieties. As the diet becomes more and more varied, the flora will rapidly increase in number and in the varieties present. The nature of the diet, however, will always modify the intestinal flora. Other conditions which influence the character of the bacterial action in the intestines are:

1. Impaired gastric digestion (gastric stasis).
2. The relative solubility of the food in the digestive juices.
3. Any condition retarding the passage of the food through the intestine

(intestinal stasis). (The longer the period during which the food is retained in the intestine, the greater the opportunity for putrefactive processes to take place.)

4. Impaired intestinal absorption of protein, and, lastly,

5. The percentage of water present. When the matter in the intestine is very dry, bacterial growth is hindered. Therefore, the putrefactive action is reduced.

There are, then, conditions very favorable to the formation of toxic substances. They may be outlined thus:

Reduced quantities of gastric juices in the stomach.

Dilution of these juices by water or other fluids taken with the food.

The use of food rich in proteids and low in carbohydrates.

The use of food or drink containing large numbers of anearobic bacteria.

The retention of the food by the intestines for too great a period of time.

It is not necessary that all of these conditions occur at the same time. Any one may be sufficient to create anearobic decomposition in the intestines.

The body is provided with means to prevent large increases in undesirable bacteria in the intestines or the passage of these bacteria (or the toxic substances which they produce) from the digestive system to the circulatory system. These defenses, as most of you know, are:

1st. The acidity of the stomach.

2nd. The presence of acid producing bacteria in the intestines.

3rd. The action of the mucosa cells.

4th. The liver.

5th. The internal secretive glands.

In order to reach the large intestine, bacteria admitted in food to the mouth must pass through the stomach, and under usual conditions, remain in the stomach for a period of time. Here they are subjected to the action of the stomach fluids which are acidified with hydrochloric acid. Since most vegetative forms of bacteria are destroyed by hydrochloric acid a small per cent. of the number of bacteria entering the mouth ever reach the intestines under normal conditions. If, by some derangement of the digestive system, the stomach contents become weakly acid or alkaline, increased numbers of bacteria are permitted to enter the intestines directly. Liquids, such as milk or water, for example, dilute the stomach juices and also pass through the stomach rapidly. Thus it is possible even in the normal condition of the stomach for large numbers of bacteria to pass into the intestines.

When the bacterium reaches the intestine, it must begin at once a battle royal for supremacy over other varieties of bacteria. It must align itself with one of two groups, the putrefactive group, or the lactic acid producing group. Some bacteria, however, are capable of joining either group, and will align themselves with the group which appears to predominate. For example, bacillus coli is capable of living ærobically and producing acid or of living anærobically and aiding in the putrefactive processes. The change from the acid condition of the intestine to a putrefactive condition depends mainly on the nature of the food supply. Substances rich in sugar, which on decomposition produce acid easily, such as milk, assist in the maintenance of the acid condition of the intestine. Other substances, such as meat which takes up oxygen, produce anærobic conditions, and assist in the production of putrefactive conditions.

When the acid producing bacteria predominate in the intestine, and the contents of the intestine are therefore acid, there is little opportunity for auto-intoxication, since the toxines causing the disturbance can only be produced under strictly anærobic, putrefactive conditions. It is, therefore, only with these latter effects that we are interested in this discussion. If, for any reason, the putrefactive organisms predominate in the intestines, toxic substances, such as indol, skatol, putrescin, cadaverin, methyl mercaptan, may be formed.

If unprevented, these toxines, together with the bacteria themselves, will enter the portal vein and eventually the circulatory system. Under normal conditions, however, they do not reach the major circulatory system. They may be absorbed or rendered inactive by the eipthelial cells of the mucosa, or by its excretions. They may be retained and destroyed by the toxicolytic power of the liver. They may be destroyed by the antitoxic action of the excretions of the intestinal glands, thyroid gland, pituitary body and suprarenal capsules. No one of these agencies necessarily performs the entire work of destroying the toxines, but each does a part. In some cases the mucosa may be particularly active; in others, it may be the liver or the glands. When one defense begins to fail, the others are forced for a time into greater activity. Under conditions of prolonged abuse, or overwork, the cells of the mucosa lose their neutralizing power. The hepatic cells of the liver then become saturated with the poisons that they have absorbed and become incapable of further reaction, and, finally, the antitoxic glands become altered and fail to contribute the necessary amount of antitoxin to the blood. It is then possible for the poisonous compounds to pass unchanged from the intestinal tract into the major circulatory system where they produce various symptoms of disease, according to their nature and quantity. They may affect,

1st. The heart.
2nd. The arterial blood pressure.
3rd. The respiratory system.
4th. The nervous system.
5th. The general nutrition.
6th. The urinary system.

THE RELATION BETWEEN IMPURE WATER AND AUTO-INTOXICATION.

Thus far, we have only hinted at the relation between impure water and intestinal tract infection, one of the most important results of which is auto-intoxication. We have stated that among other causes of the breakdown of the defensive organs of the alimentary system is that due to a large increase in the putrefactive bacteria entering the intestine in the food. We shall not attempt in this paper to ascribe this putrefactive action to particular forms of bacteria because this phase of the question has not been studied sufficiently to include at this time all of the bacteria which may be directly or indirectly associated in the reactions producing auto-intoxication. It is sufficient to state that, as a general thing, the authorities consulted concur in the belief that the anaerobic bacteria are chiefly concerned and that the anearobic bacteria most prominently mentioned have been of the spore forming variety, included in which are the B. ærogenes capsulatus, B. enteriditis sporogenes, B. putrificus, B. anarobicus alcaligenes.

In considering the possible effect of polluted water in intestinal tract infections, it must be remembered that the secretion of the gastric juices is most active at the time that freshly digested food is in the stomach and, therefore, while uncooked food may be the most potent factor in the induction of foreign bacteria into the digestive tract, the bacteria thus infested are subjected to the maximum disinfection produced by the gastric juices. When the stomach is idle, the production of gastric juices is very slight and it is under these conditions that water is regularly and frequently taken. It is to be remembered that liquids, and particularly water, pass more rapidly from the stomach to the lower intestines than do solids and, therefore, the time element, which is an important factor in the destruction of foreign bacteria, is materially lessened, and, lastly, that the percentage of water present in the intestines materially influences the character of the bacterial action in the intestine.

If, therefore, the supply of putrefactive bacteria through the agency of water is constant, though small in number, and the diet of the person imbibing impure water is favorable to the putrefactive bacteria, it is not unreasonable to assume that these small numbers will in time, or under accidental conditions, produce anærobic putrefaction and eventually intestinal tract infections and the resultant auto-intoxication.

So long as bacteria which are concerned in chronic intestinal tract infections are evacuated, so long will these bacteria be present in greater or lesser quantities in sewage polluted water, and we have a repetition of the same phenomena which are present in the causation of typhoid fever and other acute gastro intestinal disturbances. As a matter of fact, those bacteria which have been most prominently mentioned in connection with chronic intestinal tract infections, and which are generally of the spore forming variety, have frequently been isolated from the water supplies of various cities.

Nearly everyone in the medical world today is more or less familiar with the theorem formulated by Hazen and the so-called Mills-Reincke Phenomenon. Mr. Hiram F. Mills, Member of the Massachusetts State Board of Health, and Chief Engineer of the Locks and Canals on Merrimack River, observed that shortly after the introduction of a filtered and purified water supply in Lawrence, there was a marked decrease, not merely in the death rate from typhoid fever, but also from other diseases. At the same time Dr. J. J. Reincke, Health Officer of Hamburg, Germany, observed a similar effect on the death rate of his city following the installation of a purer water supply. From these observations, together with observations made by him in the cities of Troy and Albany, Mr. Allen W. Hazen evolved a theorem which he states as follows: "Where one death from typhoid fever has been avoided from the use of better water, a certain number of deaths, probably two or three, from other causes, have been avoided."

Professor W. T. Sedgewick and Mr. J. S. MacNutt have made further studies of the Mills-Reincke phenomenon and, in addition to the cities above cited, examined the death rates of Lowell and Binghamton and found that following the introduction of a purer water supply in these cities, there was a decrease in the number of deaths due, not only to typhoid fever, but to other causes. They found that the decrease in death rate was particularly noticeable in such diseases as diarrhœa, *cholera infantum*, other *gastro intestinal diseases*, pneumonia, pulmonary tuberculosis and bronchitis. Furthermore, they noted an apparent improvement in the general health of the community, not traceable to the reduction in these diseases.

Of the diseases just mentioned, it will probably be admitted that the causative factor in the production of diarrhœa, cholera infantum, pneumonia and pulmonary tuberculosis may be bacterial. We will venture to state that most gastro intestinal diseases have their origin through the agency of bacteria. It will also be admitted by most that typhoid, cholera, diarrhœa, cholera infantum, dysentery and other acute gastro intestinal diseases may be water borne. There are some who claim that pulmonary tuberculosis may be conveyed through the medium of water. So far as this paper is concerned, however, the most interesting fact here presented is that all of the acute gastro intestinal diseases have, at one time or another, been attributed to water. If this be so, why may not chronic intestinal tract infections be water borne?

Two hypotheses have been suggested to explain the improvement in the general health tone, aside from those diseases which are known to be specifically water borne. One credits the reduced death rate to the greater human resistivity following a reduction of the organic matter, or filth, in a water supply, but it has never been definitely shown that filth per se, minus infection, will produce disease. Filth may be deleterious and harmful and tend to reduce the vital resistance of the body, but the amount of organic matter, or filth, which may be present in a drinking water, which is inoffensive to the taste and smell, is so small that its pathological significance is minimized, if not eradicated.

The other hypothesis is that the improvement is due solely to the elimination of bacteria which may be causative of disease but whose etiological significance is not now known. We know that the elimination of specific bacteria which are now recognized as the etiological factor in specific disease will reduce specific diseases such as typhoid and cholera. It may be that the removal of many other bacteria not now recognized as the etiological factor in the causation of disease may be accountable for the reduction in the general death rate as noted. As a matter of fact, the flora of the intestinal tract includes many forms and varieties of bacteria which are not at this date associated with disease. The function of these bacteria is not known and the variety of species present in the intestines of man is not probably generally appreciated. In fact, the consensus of opinion of the writers of the present day is that the species of bacteria present in the intestines of man is very limited.

Our studies have carried us into a tabulation of the various species of bacteria which have been isolated from the intestinal tract, or the human fæces, and the results of these findings are included in a table which we present with this paper. In every instance, the name of the authority who isolated the bacterium from the sources mentioned has been given. The classification of the bacteria as presented may be subject to much difference of opinion, as our studies have clearly indicated that there is no well defined method of classifying bacteria and much confusion exists in any attempt at classification. We, therefore, present this table, not for the purpose of formulating a classification, but rather to indicate the great variety of forms included in the intestinal flora.

A study of this table, conjoined with the knowledge that a year seldom passes without establishing the direct connection between a specific disease and a bacterium formerly unassociated with disease, will lead one to concede that many of the bacteria, listed in this table, but not now associated with disease, may possess the potential ability to produce disease. The authors believe that the reduction in the general death rate, following the introduction of pure water, which has been noted, can be attributed to a reduction in bacteria rather than to a reduction of filth. The correctness of this view is supported by a consideration of the relation of bacteria to intestinal tract infections which may not of necessity be acute, as in the case of diarrhœa, dysentery, enteritis and typhoid, but which may develop a condition of toxæmia which affects the general health tone and thereby increase susceptibility to other diseases, not alone those at present associated with bacteria but those unassociated with them as well.

That there are many cases of intestinal tract infection at the present time which pass unheeded and unnoticed is the consensus of opinion of a number of eminent scientists and physicians who have made a special study of these infections. Chief among the results of chronic infection is the socalled auto-intoxication, which is another name for many forms of indigestion or derangement of the processes of digestion.

It has been found when careful studies have been made that more people are suffering from intestinal tract infection and auto-intoxication than is usually supposed, and we believe, if a careful investigation of the subject were made, it would be found that many people in our congested communities are suffering from this disturbance. When a person is suffering from impaired digestion, affected heart, a diseased condition of the kidneys, or a nervous breakdown, that person must naturally be in a much more susceptible condition toward other diseases. Moreover, the problem of the prevention of disease has only been partially solved when the infections of cholera infantum, dysentery and typhoid fever are broadly checked by modern sanitary measures. There still remains the more elusive task of preventing the recurrence of the severe chronic infections in the digestive tract. The acture infections like dysentery and typhoid are so numerous and obtrusive in their manifestations that it is impossible to overlook them, but chronic infections are obscure in their manifestations and seldom are found in epidemic form. Hence, they pass unnoticed. The injurious effects of the chronic infections are none the less real.

It is not the intention of the authors to ride a hobby or to insist upon a theory to the exclusion of other theories. We have had entirely too much of this in modern sanitation, but it seems wrong to assume that various morbid manifestations are inevitable or inherited. The effects of chronic poisoning of gastro-enteric origin are understood by few persons, for it must not be forgotten that in addition to reduced physical resistivity, these enterogenic intoxications of the nervous system may be extremely detrimental to character and contribute to complicate and mar the finer human relations. They entail a severe economic loss to the communities in which they occur through the partial failure of performance resulting from the reduced efficiency of the individual suffering therefrom.

It would seem that a proper regard for the inestimable benefits to be achieved by any process which will aid in the reduction of chronic intestinal tract infections will add to the significance to be attached to the reduction in the general death rate following the introduction of such a process, and a proper regard for these infections will tend to minimize the tendency to over-evaluate results achieved by such a process as shown by an individual study of the reduction in a specific disease, such as typhoid. The time has come when the sanitarian should judge of the value of a process, not by the reduction in the death rate along specific lines alone, but also by its effect on the general health tone of the community. A proper appreciation of the importance of the enterogenic intoxications will certainly tend to eliminate the preponderating value placed upon the prevention of epidemics, one might say almost to the exclusion of a consideration of deleterious endemic conditions.

The sanitarian has been so eminently successful in the prevention of epidemic that he should now turn his attention to the chronic affections which so seriously impair the usefulness and comfort of a great portion of our population. It is chiefly for the purpose of focusing attention in this direction that this paper is presented, though the theory outlined suggests a rational explanation for the "Hazen Theorem."

BACTERIA OF THE INTESTINAL TRACT. BACILLI—NON SPORE FORMS.

Organism	Obligate Anaerobe	Facultative Anaerobe	References
Bacillus coli	O	+	Escherich, als.
bifidus	+	O	Tissier, Recherches sur la flora intestinale des nourrissons.
typhosus	O	+	Zopf, als.
anaerobicus, minutes	+	O	Tissier, 1. c.
acidophibus	O	+	Tissier, 1. c.
exilis	O	+	Tissier, 1. c.
anaerobius-perfacteus	+	O	Tissier, 1. c.
alcaligens	O	+	Petruschky, Cent. Bakt. 1896, Vol. 19, p. 187. Ford, Studies Royal Victoria Hosp., Vol. 5, 1903.
alcalescens (2)	O	+	Ford, 1. c.
pseudo-dysentericus	O	+	Ford, 1. c.
enteritidis	O	+	(Gartner) Ford, 1. c.
galeatophilum	O	+	Ford, 1. c.
entercus (2)	O	+	Ford, 1. c.
plebeins	O	+	Ford, 1. c.
infreguens	O	+	Ford, 1. c.
recti	O	+	Ford, 1. c.
pylori	O	+	Ford, 1. c.
Bookeri	O	+	Ford, 1. c.
cloacae (2)	O	+	(Jordan) Ford, 1. c.
gastricus (2)	O	+	Ford, 1. c.
liquifaciens (2)	O	+	(Frankland) Ford, 1. c.
iliacus	O	+	Ford, 1. c.
chylogenes (2)	O	+	Ford, 1. c.
leporis	O	+	Ford, 1. c.
dubius	O	+	(Kruse) Flügge, Die Mikro-organismen, 1896. Ford, 1. c.
jejunalis	O	+	Ford, 1. c.

Organism	Obligate Anaerobe	Facultative Anaerobe	References
Bacillus germinus	O	+	Revanel, Matzuschita, Arch. f. Hyg., Vol. 41, p. 211, 1912.
devorans	O	+	(Zimmermann) Matzuschita, 1. c.
æropilus	O	+	Matzuschita, 1. c.
tortuosus	+	O	Debono, Centralblt. f., Bakt. Bd. 62 Heft. $\frac{3}{4}$ Orig., p. 229.
berolinensis, ruber	O	+	Matzuschita, 1. c.
bruneus	O	+	Matzuschita, 1. c.
fluorescenes	O	+	(Zimmermann) Matzuschita, 1. c.
pyocyanes	O	+	Matzuschita, 1. c.
dimiorphus-longa	O	+	Distaso, Centralbl. f. Bakt., Vol. 62, Orig. 6, 1912.
variabilus	+	O	Distaso, 1. c.
acuminatus	O	+	Distaso, 1. c.
longus	O	+	Distaso, 1. c.
pseudoramosus	+	O	Distaso, 1. c.
cornutus	+	O	Distaso, 1. c.
bullosus	O	+	Distaso, 1. c.
lævis	O	+	Distaso, 1. c.

BACTERIA OF THE INTESTINAL TRACT. BACILLI—NON SPORE FORMS.

Organism	Obligate Anaerobe	Facultative Anaerobe	References
Bacillus thetaiotaomicron	O	+	Distaso, 1. c.
variegatus	O	+	Distaso, 1. c.
oxygenes	O	+	Ford, 1. c.
bienstockii	O	+	(Schröter) Ford, 1. c.
acidiformians	O	+	(Sternberg) Ford, 1. c.
minutissimun	O	+	(Migula) Ford, 1. c.
aerogenes	O	+	(Migula) Ford, 1. c.
duodenale	O	+	Ford, 1. c.
chymogenes	O	+	Ford, 1. c.
havanieuse	O	+	Ford, 1. c.
lutescenes	O	+	(Sternberg) Ford, 1. c.
laterium	O	+	Matzuschita, 1. c.
halvolum	O	+	Matzuschita, 1. c.
limbatum	O	+	Matzuschita, 1. c.
pseudo coli-anaerobic	+	O	Jungano-Distaso, Les Anaerobes, Paris 1910.
ventriosus	O	+	(Tissier) Jungano-Distaso, 1. c.
proeacutus	O	+	(Tissier) Jungano, 1. c.
capillosus	O	+	(Tissier) Jungano, 1. c.
cylindroide	O	+	(Rocchi) Jungano, 1. c.
dysenteriæ	O	+	(Shiga) Chester Detrm. Bact. p. 246.
vesiculosus	O	+	McConkey, Jour. Hyg., Vol. 5, p. 333 and Vol. 9, p. 68.
oxytocus perniciosus	O	+	McConkey, 1. c.
coli-anaerogenes	O	+	McConkey, 1. c.

Organism	Obligate Anaerobe	Facultative Anaerobe	References
Bacillus ilei	O	+	Gillespie, Jour. Path. & Bact., Vol. 1, p. 279.
ærogenes	O	+	(Escherich) Winslow, Science, Vol. 26, p. 675.
acidi lactici	O	+	(Hueppe) Melia Jour. Inf. Dis., Vol. 8, p. 241.
lesagei	O	+	(Trevisan) Lesage, Bul. Aced. Med. Paris, October 1887.
erythrogenes	O	+	Crotenfelt, Fortschritte d. Medizin, No. 2, 1889.
ærobicus	O	+	Klein, centlbt. f. Bakt., Vol. 10, p. 186.
colorabalis	O	+	(Kruse) Flügge, 1. c.
tachyctonus	O	+	Fischer, Deut. Med. Wochensch 1894, No. 26–28.
acetogenes	O	+	Distaso Compt. Rend. soc. Biology, 1911.
disagregans	O	+	Distaso, 1. c.
rigidus	O	+	Distaso, 1. c.
pseudobulgaricus	O	+	Distaso, 1. c.

BACTERIA OF THE INTESTINAL TRACT. BACILLI—SPORE FORMS.

Organism	Obligate Anaerobe	Facultative Anaerobe	References
Bacillus vulgaris	O	+	(Hauser) Ford, 1. c. Chester, p. 244.
vulgatus	O	+	(Trevisan) Ford, 1. c. Chester, p. 271.
cereus	O	+	(Flügge) Ford, 1. c. Chester, p. 278.
mycoides	O	+	(Flügge) Ford, 1. c. Chester, p. 189.
brevis	O	+	(Migula) Ford, 1. c.
subtilis	O	+	(Ehrenberg) Ford, 1. c.
anthracoides	O	+	(Hueppe) Ford, 1. c.
arachnoideus	O	+	(Migula) Ford, 1. c.
sporogenes	+	O	Klein, Rep. Med. Off. Loc. Gov. Bd., Vol. 25, p. 171.
perfringens	+	O	(Tissier) Jungano, 1. c.
welchii	+	O	(Welch) Herter, Infections Intestinal Tract, p. 119.
anearobicus alcaligenes	+	O	Debono, 1. c.
sporogenes coagulans	+	O	Debono, 1. c.
putrificus ovalaris	+	O	Debono, 1. c.
fissus	+	O	Debono, 1. c.
regularis filiformes	+	O	Debono, 1. c.
anearobicus tenius	O	+	Distaso, 1. c.
putrificus	+	O	Flügge, Die Mikro-organismen, 1886.
mesentericus	O	+	(Trevisan) Combe, Auto-intoxication.

BACTERIA OF THE INTESTINAL TRACT. BACILLI—SPORE FORMS.

Organism	Obligate Anaerobe	Facultative Anaerobe	References
Bacillus vitalis	O	+	Chester, 1. c., p. 286.
lacteus	O	+	(Chester) Matzuschita, 1. c.
tenius citreus	O	+	Chester, 1. c., p. 273.
angulosus	O	+	Distaso, 1. c.
implectans	O	+	Ford, 1. c.
lacticola	O	+	Ford, 1. c.
vermiculare	O	+	Ford, 1. c.
infantilism	+	O	Herter & Kendall, J. Biol. Chem., Vol. 5, p. 283.
vacuolosis	O	+	Sternberg, Manual Bact. 1892, p. 717.
Sanfilicei	O	+	Sanfelice, Zeit. f. Hygiene, Vol. 14, p. 372.
taveli	O	+	Taveli, Centblt. f. Bakt., Vol. 23, p. 538.
subtiliforme	O	+	Schröter, Pilz. Schles. 1886, p. 160.
simile	O	+	Schröter, 1. c.

BACTERIA OF THE INTESTINAL TRACT. COCCI.

Organism	Obligate Anaerobe	Facultative Anaerobe	Reference Name	References
Classification of C. E. Winslow.				
Micrococci:				
luteus	O	+	M. luteus	(Cohn) Matzuschita, 1. c.
flavus	O	+	M. flavus	(Flügge) Matzuschita, 1. c.
candicans	O	+	M. rosettaceus	(Zimmermann) Matzuschita, 1. c.
anearobicus	+	O	M. anearobicus	Tissier, 1. c.
Streptococci:				
fæcalis	O	+	Str. intestinalis	Tissier, 1. c.
pyogenes	O	+	Str. pyogenes	Matzuschita, 1. c.
gracilis	O	+	Str. coli	Escherich Die Dambakterim des Saüglings 1886.
Albococci:				
tetragenus	O	+	M. ovalis	Tissier, 1. c. Escherich, 1. c.
pyogenes	O	+	Staph. pyogenes albus	(Rosenbach) Ford, 1. c.
Rhodoccus roseus	O	+	M. roseus	Matzuschita, 1. c.
Aurococcus aureus	O	+	Staph. pyogenes aureus	(Rosenbach) Ford, 1. c.
Classification of C. E. Winslow.				
Sarcina:				
lutea	O	+	Sar. lutea	(Schröter) Matzuschita, 1. c.
flava	O	+	Sar. flava	De Bary, 1887.
cervina	O	+	Sar. cervina	Stubenrath, Lehman & Newmann, Bakt. Diag. 1896.
Sar. fusca	O	+	Sar. fusca	Gruber, Arbeit, Bakt. Inst. Techn. Hochschule Karlsruhe, I, 1895.
Sar. aurantiaca	O	+	Sar. aurantiaca	(Flügge) Ford, 1. c.

BACTERIA OF THE INTESTINAL TRACT. MISCELLANEOUS FORMS.

Organism	Obligate Anaerobe	Facultative Anaerobe	References
Pseudomonas:			
Pseudomonas ovalis	O	+	(Revanel) Ford, 1. c.
aeruginosa	O	+	(Schroter) Ford, 1. c.
fluorescens	O	+	Ford, 1. c.
monadiformis	O	+	Messea. Riv. d'iegiene, Rome 1890.
pyocyanea	O	+	Gessard, These de Paris 1882.
Microspira comma	O	+	Migula, System der Bakt. 1897.
protea	O	+	Buchner, Sitzungsber. d. Ges. f. Morph. u. Physiol., München, I, p. 21.
Spirillum massauah	O	+	Kruse, Flügge Die Micro-organismen, p. 589.

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THE CROTON BUG (ECTOBIA GERMANICA) AS A FACTOR IN BACTERIAL DISSEMINATION.*

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Cockroaches have long been looked upon with some suspicion as possible carriers of disease and are certainly regarded with much disgust by everybody. If the house fly is such a potent transmitter of infection, why not the cockroach, at least to a large degree? While the house fly is active in the day time, walking upon prepared human food, depositing thereon its load of bacteria, the cockroach is actively engaged, under cover of night, in a similar performance. The two insects by analogy must relate to the transmission of bacteria in a similar manner, *i. e.*, must collect bacteria upon their feet and mouthparts by crawling upon and feeding on filth which may be charged with bacteria and depositing these, while in the act of feeding, upon human food.

The cockroach has biting mouth parts like the grasshopper, hence could not relate to the transmission of disease by direct inoculation as does the stable fly for example, which has piercing mouthparts. If the structure of the cockroach is such that it can pick up bacteria easily, and if it can be shown that the cockroach invades places where contaminating material, for example sputum or excrement is found, then a chain of strong circumstantial evidence could be woven that the roach may be a factor in the dissemination of such diseases as tuberculosis, dysentery and probably typhoid fever. The food habits of the roach are certainly such that there is ample opportunity for the contamination of the food of man.

An investigation of this problem was made, partly in the field, and a series of experiments conducted to this end during the autumn of 1912 in the Parasitology Laboratory of the University of California under the direction of the senior author.

Structural. Comparing the feet and mouthparts of the house fly and the croton bug it will be seen at once that the latter is far less adapted to the collection of filth, inasmuch as the feet, especially, are not so well provided with spines and hairs as are the feet of the house fly. However, the weight of the insect and surface in actual contact with infective material partly compensate for the above structural deficiency.

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*This paper was completed before the writers were aware of the work done and published by Longfellow in the American Journal of Public Health, Vol. III, No. 1.

Can the roach pick up specific bacteria? In order to answer this question one of these insects was allowed to crawl over a culture of Bacillus pyocyaneus a green chromogen, in a test tube. The growth on the agar in this tube was not very profuse. The insect was next transferred to a sterile agar plate upon which it was permitted to walk one minute. The roach was then liberated and transferred to a second plate for one minute, and then to a third plate in a similar manner. The agar plates were then incubated for twenty-four hours at a temperature of 37°/C. At the end of this time a good growth of the green chromogen, Bacillus pyocyaneus, had developed on all three plates.

This experiment goes to prove that the legs of the roach are constructed so as to enable it to pick up bacteria of a given kind and enough to heavily inoculate three plates.

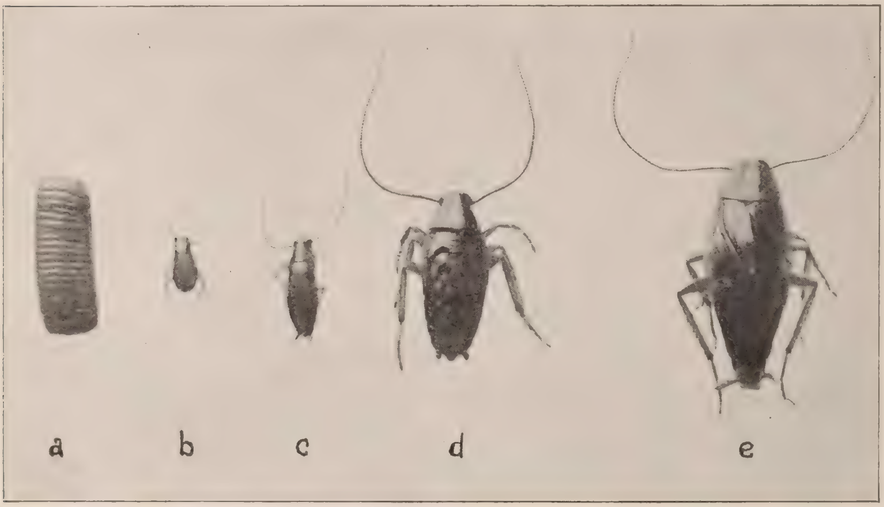

Fig. 1. Showing life history of the croton bug (Ectobia germanica). (a) Egg case or oothecum; (b) and (c) young stages; (d) nearly full grown roach; (e) mature female with egg case partly protruding from abdomen.

Can the roach carry specific bacteria to human food? Having determined that the roach can pick up known bacteria, the next thing was to prove that it could deposit these same organizms on human food. In order to do this one gram of sugar was exposed to a cockroach that had previously walked just once over a culture of Bacillus pyocyaneous, the same chromogen used above, on an agar slant. The insect remained with the sugar, feeding upon it, for three minutes. The sugar was then dissolved in 5 cc. of sterile water and plated on three agar plates, using 1 cc. of the solution for each. The plates were incubated for twenty-four hours at 37°/C.

Bacillus pyocyaneus was recovered on all three plates, the growth on none being scanty. The recovery of the test culture in the sugar solution showed that the contaminated cockroach could in turn contaminate the food over which it crawled and upon which it fed.

The bacterial population of the croton bug. Six individuals were taken from a collection of roaches taken from various localities and permitted to crawl for one minute over six sterile agar plates (one roach for each plate). These plates were incubated for forty-eight hours at 39°/C. Each plate showed a good growth, the colonies on examination proving to be saprophytic bacilli without exception.

TABLE I.

Showing Number and Kind of Bacteria Carried on Individuals of the Croton Bug.

No. of the Roach.	Part of the Roach Plated.	Bacterial Count per cc.	Kind of Bacilli Present.
1	Posterior pair of legs	1200+	(a) Staphylococcus albus. (b) Non-spore bearing bacillus.
2	Posterior pair of legs	1600+	(a) Staphylococcus albus. (b) Non-spore bearing bacillus.
1	Remaining legs	950	(a) Staphylococcus albus. (b) Small non-spore bearing bacillus. (c) Spore bearing air bacillus.
2	Remaining legs	1200	(a) Spore bearing air bacillus. (b) Staphylococcus albus.
1+2	Antennæ	384	(a) Spore bearing air bacillus. (b) Staphylococcus aureus. Yellow pigment.
1	Stomach contents	14	(a) Minute bacilli (unidentified).
	Total	5348	for a dilution of 1/5.

5 x 5348 ÷ 2 = 13370 bacteria, minimum number present on each roach.

To secure an approximate estimate of the number and kind of bacteria carried by roaches two of these insects were treated as follows: After sterilizing pipettes, forceps, tubes, etc., 5 cc. of distilled water was placed in each of the five test tubes. Into these tubes were placed the legs and antennæ of the roaches,—the posterior pair of legs of one roach into one tube, those of the other roach into a second tube, the antennæ of both roaches in a third and the remaining pairs of legs of the first roach in the fourth and the remaining pair of legs of the other roach in the fifth tube. The stomach contents were plated on agar. The tubes were shaken vigorously for three minutes in order to wash the parts well and then 1 cc. of the water in each tube was plated on agar and incubated twenty-four hours at 37° C. The results were all positive as the accompanying table (P. 931) indicates.

From the preceding table it will be seen that each roach carried on its feet and antennæ and in its stomach a minimum of 13,370 bacteria. While this does not represent a fair estimate for all roaches, since only two individuals were used, we are here shown that the roach can carry a large number of bacteria along with it. Esten and Mason (Storrs Agric. Exp. Sta. Bull., No. 51) have shown that the number of bcateria carried by a fly range all the way from 550 to 6,600,000, with an average of one and one fourth million bacteria on each. Thus by comparison it may be seen that the roach carries fewer bacteria on the average.

It is furthermore interesting to note that there were more bacteria on the single pair of posterior legs than on the remaining two pairs combined. This is probably explained by the use the cockroach makes of its hinder pair of legs. The tibiæ and tarsi are in contact with the surface on which the insect walks, being parallel with the body. Very often the insect stands on the hind pair of legs, with the remaining legs barely touching the surface. On the other hand, the remaining legs are frequently brushed by the antennæ.

Environmental. The last link in the chain of evidence against the cockroach is its normal environment, giving the insect an opportunity to contaminate itself with pathogenic organisms. Such an environment would be an accessible unsanitary privy close to the kitchen or pantry, in which case there is at least the possibility of the transference to the food of man of the causative organisms (bacillary) of dysentery and diarrhœa, and still more remotely of typhoid fever.

Conditions favoring the transmission of the tuberculosis bacillus are relatively more common. Two instances may be cited. These existed in the forecastle of two vessels. On these two particular vessels there were no separate mess rooms provided for the sailors, and their food was served in the same room in which they slept. The bread, butter and sugar were standing exposed, and cockroaches were to be seen on the floors, walls, and on both the bread and sugar. These sailors were in the practice of constantly spitting on the floor. If one or more of these sailors should be tubercular there is at least the possibility here of transmission by the roach to the food. A third instance may be mentioned of a certain residence in which the croton bug was abundant and in this house there also lived a consumptive in the last stages of the disease. This patient did not use sputum cups, and although belonging to a refined family had the pernicious habit of spitting in the darker corners of the room and behind pieces of furniture. In this house lived a half-dozen students who also took their meals here. Roaches were commonly seen in the room in which the patient lived and roaches swarmed in the pantry and kitchen at night. Surely here existed a condition that favored the transmission of tubercle bacilli. Unfortunately the reputation of this house in one of the more select districts of the city was of more importance than the lives of the inmates of the house.

Life history and habits of the croton bug. The croton bug is nocturnal in habit, but may be seen roaming about during the day, although their activity is limited. Generally the roaches collect in huddled groups during the day and remain inactive. Their main requirements for activity are first a fairly high temperature, secondly, darkness, and lastly, a supply of food. Roaches are ordinarily encountered in kitchens, galleys, restaurants, bakeries, etc. These insects are omniverous in food habit, favoring starchy and sweet materials; they may also feed on excrement and will readily devour their dead brethren and cast-off skins.

The eggs of the roach are laid in pairs (13 pairs usually) in an egg case or oothecum (Fig. 1) which, when filled, protrudes from the abdomen of the female. The females may evidently carry these cases about with them two months or more when they are finally deposited in some dark crevice and the young roaches and nymphs hatch out in twelve days more or less. The young roaches are at first almost white and transparent but soon become brownish and resemble the adults except in size and for the absence of wings. The young roaches moult their skin soon after emergence from the egg case, and moult a second time in about four weeks. There are apparently about six moults before the roaches are mature and certainly a year or more is required before this is accomplished.

Suggestions for control. Trapping methods are least successful in the control of the croton bug; it is certainly far more wary than the larger species. The ordinary glass jar trap method employed for the large species is not effective. The croton bug can crawl up the sides of a glass jar without difficulty and thus make its escape as well as its entrance. A dark box trap is preferable with one or more tubular paste-board entrances projecting both inside and outside. The mouth of the tube inside the box must be guarded either with a simple trap door or adhesive substance around the outside of the tube and immediately adjacent to the mouth to prevent the roaches from escaping after feeding on the bait. The box may be baited with sugar, sweet chocolate, a little stale beer or the like.

An excellent roach poison can be made by mixing powdered sugar (or sweet chocolate) and borax equal parts. The two ingredients must be thoroughly well mixed. This material is then placed in little heaps or in vessels accessible to the roaches. Another method of considerable value advanced by several observers is the following: mix thoroughly plaster of Paris one part, and flour three parts, place this mixture in a saucer with a little water readily available. The roaches eat the flour-plaster-Paris mixture for the sake of the flour, drink the water and soon die from the effect of the plaster of Paris caking in the stomach.

SUMMARY.

1. The croton bug, Ectobia germanica, feeds by preference upon the food of man.

2. The croton bug is commonly found in situations where infective sputum or excrement exists.

3. The croton bug is structurally equipped to collect filth and bacteria upon its appendages, though this equipment is not as effective as in the house fly.

4. The croton bug has the ability to pick up specific bacteria on its feet and mouthparts and deposit these on human food, *e. g.*, sugar.

5. The bacterial population of a single croton bug was found to be a minimum of 13,370 bacteria.

6. The croton bug carries more bacteria upon its hind pair of legs than on its middle and fore legs combined.

7. The croton bug is normally nocturnal in habit though it may be active during the day, and are more or less omniverous in food habit.

8. The eggs of the roach are laid in pairs (13 pairs usually) in an egg case which is carried for several months by the female.

9. The young roaches require evidently not less than one year to mature and probably more.

10. The usual trapping methods are not very effective in the control of the croton bug. Sweet mixtures containing borax or flour and plaster of Paris with water available are recommended as good remedies.

Berkeley, California, December 10, 1912.

A STUDY OF THE WATER OF LAKE MICHIGAN.

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Read before the Sanitary Engineering Section, American Public Health Association, Washington, D. C., September, 1912.

The Great Lakes furnish an inexhaustible supply of fresh water for the cities along their borders. In the early days these lakes contained pure water, and the quantity was so enormous that it seemed impossible ever to pollute them to any marked extent by the pouring of sewage and industrial wastes into them. With the development of population, however, and the enormous growth of our cities, accompanied as it was by a tremendous development of industrial and commercial enterprises, the water along the shores has in many places become badly polluted.

The cities situated on the shores of the Great Lakes for the most part discharge their sewage directly into the Lakes, and almost all of them use the lakes as a source of supply for drinking water. In some instances, ledges or rock are supposed to form a safe barrier between the sewage outlet and the water intake. However, typhoid fever and other intestinal troubles have appeared in certain cities with great frequency.

This pollution has been added to by the enormous use of the lakes by ships, passenger and freight. Much of the land along the shores is cultivated, and many head of cattle are pastured in fields bordering either directly on the lakes or on streams running into the lake. Practically every stream which runs into the lake carries sewage from some city, village, or farm. The bottom in the shallow parts of the lake is often disturbed by winds, currents, dredges, and ships. In this way the water, particularly in the neighborhood of cities, has become so changed that it is no longer a safe source of supply. The authorities of most of the towns have been forced to a recognition of the danger by numerous outbreaks of typhoid fever and other intestinal troubles. At first the remedy seemed a simple one, and we find that the intake pipes were extended further from the shore.

The study of Lake Michigan along the Wisconsin shore has been going on at the State Hygienic Laboratory for upwards of three years, our effort being to determine under what conditions the lake could be relied on to furnish a safe water supply. In a general way, this has been done in conjunction with the Lake Michigan Water Commission, and the methods employed have been the same as used by the States of Michigan, Indiana, and Illinois.

Surveys have been made at Kenosha, Racine, Milwaukee, Sheboygan, and Manitowoc, and it is our desire and expectation to complete the work by making studies at some of the larger cities north of Manitowoc next year. At each city where examinations have been made, an inspection of the water works and sewage disposal system was carried out, together with an investigation of any other possible source of pollution along the shore.

At each city a series of seventy-two samples were collected, the collection lasting over a period of six weeks. Samples were collected at the intake and at points one mile apart up to seven miles from shore in a direction at right angles to the shore line. Collections were made every other day, when four samples were taken; the intake samples came from a depth of thirty-five to forty feet, all others were collected at the uniform depth of ten feet from the surface. Either a tug or a gasoline launch was hired for the collection of the samples, the work of collection being in charge of the local health officer. In a few cases stations were marked by buoys, in others it was decided to run the tug or launch on definite ranges by the compass, using a fixed landmark on shore, and the distance traveled was estimated by the time at full speed. This method was found to be fairly accurate.

The samples were collected in two and one-half liter bottles, and the bottles were well iced before shipment. In all cases care was taken to have the cases delivered to the State Hygienic Laboratory within twenty-four hours from the time of collection. Data regarding the direction of the wind and current, condition of the sea, and weather conditions were taken with each series of samples.

The following chemical and bacteriological tests were made on all samples: Color, odor, turbidity, free ammonia, albuminoid ammonia, nitrites, nitrates, chlorine, oxygen consumed, alkalinity, total bacterial counts on gelatine and on agar, acid colony count, and presumptive and confirmative tests for B. coli. Instead of the usual procedure of inoculating the dextrose fermentation tubes with .1 c.c., 1 c.c., and 10 c.c. respectively, quantitative determinations were made, that is, instead of one tube each for .1 c.c., 1 c.c., and 10 c.c. three tubes with 1. c.c., three with 10 c.c., and one with .1 c.c. were inoculated. In this manner, it is believed, a more precise value of the quality of the water was obtained. In general, the standard methods of the American Public Health Association were followed.

We have considered the physical appearance of the water, because in connection with a water supply, the amount of sediment in the water is of great importance. Modern standards require that a drinking water should be reasonably clear, at all times free from color and disagreeable odor, and fairly soft. Sanitary requirements demand that a drinking supply shall at all times be free from sewage pollution.

The results of chemical analyses indicate that the water of Lake Michigan along the Wisconsin shore is moderately hard, the alkalinity, which is due to carbonates of calcium and magnesium, averages about 111. The ammonias, nitrites and oxygen consumed were usually higher in shore than out, but often high values, indicating contamination, for these determinations were obtained five, six and seven miles from shore. As a rule, the water was free from any decided odor, always free from color, and very low in turbidity. Near shore the water was usually turbid but at one half to one mile or so from shore and at a depth of thirty-five to forty feet, where intake pipes were located, the water was usually free from decided turbidity.

The bacteriological results of the work carried on at each city show occasional relatively high gelatine and agar counts and the presence of B. coli in 1 c.c and 10 c.c. even seven miles from shore, thus showing the effect of wind and current. Near shore, that is from one to three miles, the results indicate that the water is often polluted and that the municipal supplies are frequently more or less polluted.

We give here a series of tables which show both chemical and bacteriological analyses at these different cities. These analyses are selected so as to show some of the best, and some of the worst samples obtained at the different points.

BACTERIOLOGICAL EXAMINATIONS OF LAKE MICHIGAN AT KENOSHA, SHOWING SAFE AND POLLUTED WATERS.

Safe Waters.

Points of Collection.	Gelatine Count.	Agar Count.	B. Coli Present in		
			.1 c.c.	1. c.c.	10 c.c.
Intake	55	2	—	—	—
1 mile east	33	5	—	—	—
2 miles east	35	2	—	—	—
3 miles east	30	4	—	—	—
4 miles east	11	2	—	—	—
5 miles east	18	5	—	—	—
6 miles east	40	6	—	—	—
7 miles east	11	1	—	—	—

Polluted Waters.

Points of Collection.	Gelatine Count.	Agar Count.	.1 c.c.	1. c.c.	10 c.c.
Intake	850	18	+	+	+
1 mile east	100	59	+	+	+
2 miles east	220	70	+	+	+
3 miles east	100	30	+	+	+
4 miles east	298	17	—	—	+
5 miles east	1,267	68	—	+	+
6 miles east	1,600	65	—	—	+
7 miles east	1,370	40	—	—	+

CHEMICAL ANALYSES OF LAKE MICHIGAN WATER AT KENOSHA, SHOWING WATERS OF DIFFERENT QUALITIES.

Source of Sample.	Turb.	Odor.	Color.	Free NH_3.	Alb. NH_3.	N'ites.	N'ates.	Cl.	Alk.	Oxy. Con.	T. S.
Intake.......	0	0	0	0.002	0.052	0.001	0.03	3.1	109.	1.1	148.
1 mile east....	0	0	0	0.006	0.098	0.001	0.02	3.7	107.	1.4	140.
2 miles east...	0	0	0	0.004	0.072	0.001	0.03	3.7	105.	1.0	145.
3 miles east...	0	0	0	0.000	0.086	0.001	0.02	2.3	103.	1.0	140.
4 miles east...	0	0	0	0.000	0.090	0.001	0.02	3.0	108.	1.4	146.
5 miles east...	0	0	0	0.000	0.072	0.001	0.02	3.0	109.	1.1	140.
6 miles east...	0	0	0	0.000	0.070	0.001	0.02	2.3	110.	1.0	138.
7 miles east...	0	0	0	0.000	0.076	0.001	0.02	2.3	109.	0.6	135.
Intake.......	30.	Sl. veg.	0	0.124	0.224	0.002	0.00	6.5	116.	2.8	180.
1 mile east....	0	0	0	0.032	0.160	0.002	0.03	4.1	114.	2.9	165.
2 miles east...	0	0	0	0.032	0.160	0.003	0.02	4.1	114.	2.9	150.
3 miles east...	0	0	0	0.032	0.152	0.002	0.03	4.1	114.	2.1	165.
4 miles east...	3	0	2	0.012	0.156	0.002	0.03	30.	111.	1.8	164.
5 miles east...	0	Sl. veg.	0	0.040	0.188	0.002	0.02	2.2	109.	1.9	162.
6 miles east...	0	0	0	0.020	0.188	0.002	0.02	2.3	109.	1.7	160.
7 miles east...	0	0	0	0.036	0.204	0.002	0.02	2.2	109.	1.8	153.

BACTERIOLOGICAL EXAMINATIONS OF LAKE MICHIGAN WATER AT RACINE, SHOWING SAFE AND POLLUTED WATERS.

Safe Waters.

Points of Collection.	Gelatine Count.	Agar Count.	B. Coli Present in		
			.1 c.c.	1. c.c.	10. c.c.
Intake............	130	10	–	–	–
1 mile east.........	38	5	–	–	–
2 miles east........	8	1	–	–	–
3 miles east........	70	4	–	–	–
4 miles east........	45	2	–	–	–
5 miles east........	44	1	–	–	–
6 miles east........	50	6	–	–	–
7 miles east........	12	10	–	–	–

Polluted Waters.

Intake............	360	46	–	+	+
1 mile east.........	765	52	–	–	+
2 miles east........	133	80	–	+	+
3 miles east........	102	20	–	+	+
4 miles east........	900	45	–	–	+
5 miles east........	4,500	2,850	–	+	+
6 miles east........	645	138	–	+	+
7 miles east........	1,050	100	–	+	+

CHEMICAL ANALYSES OF LAKE MICHIGAN WATER AT RACINE, SHOWING WATERS OF DIFFERENT QUALITIES.

Source of Sample.	Turb.	Odor.	Color.	Free NH_3.	Alb. NH_3.	N'ites.	N'ates.	Cl.	Alk.	Oxy. Con.	T. S.
Intake.......	3	0	0	0.001	0.060	0.000	0.03	4.5	101.	1.4	143.
1 mile east....	2	0	0	0.001	0.068	0.000	0.03	4.7	101.	1.4	144.
2 miles east...	4	0	0	0.000	0.064	0.000	0.02	4.7	100.	1.7	130.
3 miles east...	3	0	0	0.000	0.068	0.000	0.04	4.5	100.	1.8	136.
4 miles east...	3	0	0	0.000	0.040	0.000	0.03	4.6	101.	1.6	134.
5 miles east...	3	0	0	0.000	0.068	0.000	0.03	4.8	101.	1.3	135.
6 miles east...	3	0	0	0.000	0.050	0.000	0.02	4.2	101.	1.7	122.
7 miles east...	2	0	0	0.000	0.054	0.000	0.04	4.2	102.	1.8	118.
Intake.......	10	foul	0	0.024	0.196	0.003	0.02	9.1	100.	2.8	159.
1 mile east....	10	Sl. musty	0	0.008	0.532	0.002	0.03	7.1	101.	2.6	150.
2 miles east...	8	Sl. musty	0	0.004	0.116	0.002	0.02	8.4	102.	2.6	164.
3 miles east...	8	Sl. musty	0	0.002	0.118	0.002	0.03	5.7	100.	3.6	164.
4 miles east...	8	0	0	0.010	0.132	0.002	0.02	5.8	102.	6.8	158.
5 miles east...	8	0	0	0.002	0.124	0.002	0.02	6.7	101.	6.9	168.
6 miles east...	6	0	0	0.001	0.092	0.002	0.02	5.8	102.	6.0	170.
7 miles east...	8	0	0	0.008	0.132	0.002	0.02	5.9	102.	4.6	151.

BACTERIOLOGICAL EXAMINATIONS OF LAKE MICHIGAN WATER AT MILWAUKEE, SHOWING SAFE AND POLLUTED WATERS.

Safe Waters.

Points of Collection.	Gelatine Count.	Agar Count.	B. Coli Present in		
			.1 c.c.	1. c.c.	10. c.c.
Intake............	31	10	—	—	—
1 mile east.........	27	2	—	—	—
2 miles east........	9	1	—	—	—
3 miles east........	10	5	—	—	—
4 miles east........	17	10	—	—	—
5 miles east........	7	3	—	—	—
6 miles east........	2	0	—	—	—
7 miles east........	7	1	—	—	—

Polluted Waters.

Points of Collection.	Gelatine Count.	Agar Count.	.1 c.c.	1. c.c.	10. c.c.
Intake............	2,050	390	+	+	+
1 mile east.........	1,010	335	+	+	+
2 miles east........	2,280	840	—	+	+
3 miles east........	675	67	—	+	+
4 miles east........	156	16	—	+	+
5 miles east........	146	12	—	+	+
6 miles east........	92	13	—	—	+
7 miles east........	125	14	—	—	+

CHEMICAL ANALYSES OF LAKE MICHIGAN WATER AT MILWAUKEE, SHOWING WATERS OF DIFFERENT QUALITIES.

Source of Sample.	Turb.	Odor.	Color.	Free NH$_3$.	Alb. NH$_3$.	N'ites.	N'ates.	Cl.	Alk.	Oxy. Con.	T. S.
Intake.......	1	0	0	0.004	0.096	0.000	0.03	4.5	106.	1.9	118.
1 mile east....	5	0	0	0.002	0.078	0.000	0.03	4.3	108.	1.6	120.
2 miles east...	4	0	0	0.012	0.066	0.000	0.04	4.3	110.	1.8	129.
3 miles east...	3	0	0	0.008	0.106	0.000	0.03	4.4	106.	2.2	147.
4 miles east...	3	0	0	0.000	0.050	0.000	0.03	4.6	106.	1.2	132.
5 miles east...	2	0	0	0.000	0.048	0.000	0.02	4.2	106.	1.7	125.
6 miles east...	2	0	0	0.000	0.060	0.000	0.03	4.6	106.	1.8	118.
7 miles east...	3	0	0	0.000	0.089	0.000	0.03	4.7	107.	1.8	118.
Intake.......	3	0	0	0.092	0.186	0.002	0.03	6.5	109.	2.9	173.
1 mile east....	3	0	0	0.030	0.184	0.002	0.02	6.5	105.	2.4	125.
2 miles east...	1	0	0	0.092	0.310	0.002	0.02	5.1	106.	2.2	172.
3 miles east...	4	0	0	0.032	0.278	0.002	0.02	5.1	102.	2.4	173.
4 miles east...	3	0	0	0.196	0.160	0.002	0.03	6.7	104.	3.5	202.
5 miles east...	3	0	0	0.036	0.162	0.001	0.03	5.2	111.	2.7	175.
6 miles east...	0	0	0	0.022	0.200	0.001	0.03	5.8	105.	4.6	179.
7 miles east...	3	0	0	0.014	0.230	0.001	0.02	6.8	106.	0.5	163.

BACTERIOLOGICAL EXAMINATIONS OF LAKE MICHIGAN WATER AT SHEBOYGAN, SHOWING SAFE AND POLLUTED WATERS.

Safe Waters.

Points of Collection.	Gelatine Count.	Agar Count.	B. Coli Present in		
			.1 c.c.	1. c.c.	10. c.c.
Intake...........	55	2	–	–	–
1 mile east.........	6	2	–	–	–
2 miles east........	9	3	–	–	–
3 miles east........	2	0	–	–	–
4 miles east........	6	3	–	–	–
5 miles east........	2	5	–	–	–
6 miles east........	35	8	–	–	–
7 miles east........	4	3	–	–	–
Polluted Waters.					
Intake...........	37,000	3,000	–	+	+
1 mile east.........	21,000	930	–	–	–
2 miles east........	4,650	630	–	–	+
3 miles east........	5,500	765	–	–	+
4 miles east........	850	95	–	+	+
5 miles east........	8,880	3,000	–	–	+
6 miles east........	13,800	711	–	–	+
7 miles east........	12,500	9,000	–	+	+

CHEMICAL ANALYSES OF LAKE MICHIGAN WATER AT SHEBOYGAN, SHOWING WATERS OF DIFFERENT QUALITIES.

Source of Sample.	Turb.	Odor.	Color.	Free NH_3.	Alb. NH_3.	N'ites.	N'ates.	Cl.	Alk.	Oxy. Con.	T. S.
Intake.......	4	0	0	0.001	0.064	0.000	0.04	2.2	115.	1.5	134.
1 mile east....	4	0	0	0.001	0.082	0.000	0.03	3.1	110.	1.6	148.
2 miles east...	5	0	0	0.000	0.084	0.000	0.02	3.9	111.	1.9	145.
3 miles east...	3	0	0	0.000	0.060	0.000	0.04	3.7	111.	1.8	128.
4 miles east...	5	0	0	0.001	0.082	0.000	0.03	4.2	110.	1.7	125.
5 miles east...	3	0	0	0.002	0.074	0.000	0.03	3.4	110.	1.9	135.
6 miles east...	5	0	0	0.001	0.078	0.000	0.03	4.0	111.	2.1	130.
7 miles east...	5	0	0	0.004	0.078	0.000	0.03	4.0	97.0	2.1	131.
Intake.......	8	Foul	0	0.020	0.920	0.003	0.03	13.7	111.	4.4	156.
1 mile east....	8	Foul	0	0.016	0.162	0.002	0.03	6.8	112.	4.8	130.
2 miles east...	8	Foul	0	0.020	0.212	0.002	0.03	6.2	112.	4.7	160.
3 miles east...	8	Foul	0	0.025	0.260	0.003	0.03	6.6	112.	5.4	193.
4 miles east...	10	Foul	0	0.016	0.172	0.002	0.02	6.7	112.	3.7	168.
5 miles east...	5	0	0	0.018	0.236	0.002	0.03	6.7	112.	3.8	160.
6 miles east...	20	5	0	0.036	0.336	0.003	0.03	13.7	113.	2.8	215.
7 miles east...	6	5	0	0.032	0.180	0.002	0.03	5.5	113.	2.7	173.

BACTERIOLOGICAL EXAMINATIONS OF LAKE MICHIGAN WATER AT MANITOWOC, SHOWING SAFE AND POLLUTED WATERS.

Safe Waters.

Points of Collection.	Gelatine Count.	Agar Count.	B. Coli Present in		
			.1 c.c.	1. c.c.	10. c.c.
½ mile east.........	60	4	....	−	−
1 mile east.........	80	5	....	−	−
2 miles east........	75	3	....	−	−
3 miles east........	50	1	....	−	−
4 miles east........	46	4	....	−	−
5 miles east........	20	0	....	−	−
6 miles east........	25	4	....	−	−
7 miles east........	11	4	....	−	−
Somewhat Polluted Waters.					
½ mile east.........	900	155	....	−	+
1 mile east.........	6,000	1,000	....	+	+
2 miles east........	370	49	....	+	+
3 miles east........	4,800	21	....	−	+
4 miles east........	240	70	....	−	−
5 miles east........	315	188	....	−	−
6 miles east........	2,700	120	....	−	+
7 miles east........	100	43	....	−	−

CHEMICAL ANALYSES OF LAKE MICHIGAN WATER AT MANITOWOC, SHOWING WATERS OF DIFFERENT QUALITIES.

Source of Sample.	Turb.	Odor.	Color.	Free NH_3.	Alb. NH_3.	N'ates.	N'ites.	Cl.	Alk.	Oxy. Con.	T. S.
½ mile east....	4	S. veg.	0	0.000	0.024	0.02	0.001	3.6	107.	2.1	138.
1 mile east....	3	S. veg.	0	0.000	0.002	0.03	0.001	3.6	108.	2.0	136.
2 miles east...	0	S. veg.	0	0.004	0.024	0.03	0.000	3.8	108.	1.8	132.
3 miles east...	0	0	0	0.004	0.002	0.02	0.000	3.8	107.	1.9	134.
4 miles east...	0	0	0	0.000	0.064	0.02	0.000	3.4	107.	1.8	132.
5 miles east...	0	0	0	0.000	0.044	0.03	0.000	3.8	107.	1.9	126.
6 miles east...	0	0	0	0.012	0.016	0.02	0.000	3.3	108.	1.9	125.
7 miles east...	0	0	0	0.004	0.056	0.02	0.000	3.4	108.	1.9	125.
½ mile east....	0	Veg.	0	0.036	0.268	0.05	0.002	4.3	107.	3.5	146.
1 mile east....	0	Veg.	0	0.020	0.232	0.05	0.002	3.8	109.	3.1	146.
2 miles east...	0	Foul	0	0.108	0.232	0.03	0.002	3.8	105.	2.8	150.
3 miles east...	0	0	0	0.136	0.248	0.05	0.002	3.8	106.	3.3	153.
4 miles east...	4	0	0	0.050	0.330	0.05	0.004	3.8	109.	3.6	146.
5 miles east...	0	0	0	0.040	0.330	0.05	0.003	3.8	108.	3.3	140.
6 miles east...	0	S. veg.	0	0.020	0.240	0.05	0.005	3.0	110.	3.3	140.
7 miles east...	0	S. veg.	0	0.070	0.275	0.05	0.005	3.4	108.	3.2	138.

Summary and Conclusions.

As a result of these studies, we conclude that the water of Lake Michigan along the Wisconsin shore is not a uniformly safe source of supply. The water is polluted and at times quite heavily so, even out to a distance of seven miles from shore. The chemical and bacteriological data conclusively indicate that there are no permanent currents in this portion of the lake, and that sewage once deposited in it may be carried to various points depending on the direction and force of the wind. The prevailing currents can not be depended on to insure safety, owing to storms, and even winds of moderate force which continue for several days will modify these currents. Even in those instances where ledges of rock are supposed to form a barrier, safety is not insured.

We conclude that to insure a safe supply from the lake, the intake should be carried out twelve to fifteen miles from shore. Owing to the depth of the water, this is in many cases impractical, and involves great expense. There are only two other procedures left open. One is the purification of sewage, which would be only a partial remedy; and the other is the filtration of the water before carrying it into city mains. In any case, it seems that cities should cease the pollution of the lake by the dumping of their sewage into it. This does not entirely meet all the requirements in the case, owing to the enormous amount of shipping on the lakes. Thousands of passengers on steamships are discharging their excreta daily during the larger part of the year into the water along the shore, especially in and about harbors. It seems probable that in spite of sewage purification, which should be undertaken in any event, that the demand for filtration will increase yearly, and that eventually all these cities will be obliged to furnish filtered water to their inhabitants. In the meantime, the use of hypochlorite of calcium has been recommended, and used in a number of instances with the most satisfactory results. This must always, however, be regarded as only a temporary expedient.

The Great Lakes must still be looked upon as a most useful and inexhaustible source of supply, but more care must be exercised in the future in preserving their purity, and in selecting the locations for water supply plants.

THE SIGNIFICANCE OF THE TIME AT WHICH GAS IS PRODUCED IN LACTOSE PEPTONE BILE.

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During the summer of 1912, routine bacteriological examinations of the oysters of Narragansett Bay were made with the hope of determining the extent of the pollution of the oyster beds of Rhode Island by the sewage of cities and towns bordering on the bay. The examinations were conducted under the direction of Prof. F. P. Gorham of Brown University to whom the writer wishes to extend his thanks for the data here used. Throughout the entire series of experiments, the examinations of the oysters were made in general, according to the methods proposed in The Second Progress Report of the Committee on Standard Methods of Shell Fish Examination (December, 1911). In all cases, meat extract (3 grams to the liter) was used in the preparation of the media. Ease of preparation rendered its use invaluable in a work of this nature.

Lactose peptone bile was used as a presumptive test to indicate the presence of members of the Bacillus coli group and other lactose fermenters of intestinal origin. Inverted vials were used for the collection of the gas and the tubes were always incubated at 37° C. All inoculation into lactose peptone bile were made in duplicate and the gas was read and recorded at the end of 24-, 48- and 72-hour periods. In this paper are compiled the results obtained by comparing the number of tubes showing gas at the various periods.

During the period covered by this paper, 119 samples of oysters were examined. The beds from which these oysters were dredged varied greatly in character and position ranging from the highly polluted areas near the outlets of the sewers of the cities and towns through questionable areas which were sometimes coli-positive and again coli-negative to areas which were comparatively free from pollution near the ocean. During the examination of these 119 samples of oysters 3,570 tubes of lactose peptone bile were inoculated from which 1,929 produced gas distributed over the 24-, 48- and 72-hour periods as the following table will show:

TABLE I.

LACTOSE PEPTONE BILE TUBES SHOWING GAS.

Time in Hours	24	48	72
Number of Tubes Showing Gas	148	1361	420
Per cent	7.6	70.5	21.2

From the above table it can be seen that very few of the intestinal organisms, generally found in oysters, are able to produce gas in lactose peptone bile by the end of the 24-hour period since out of 1,929 which showed gas only 148 or 7.6 per cent. produced gas at the end of that period. By the end of the 48th hour, however, 1,361 tubes or 70.5 per cent. produced gas showing that 48 hours represents the periods in which more than a majority of the intestinal organisms usually found in the oysters, produce their gas in lactose peptone bile. Gas was recorded at the end of the 72-hour period in 420 or 21.2 per cent. The gas produced by the end of the 72d hour probably represents the result of growth of attenuated forms and spore formers since we find more of this type of gas production in places which are distant from sources of pollution as will be explained in a later part of this paper.

An examination of the map of the State of Rhode Island reveals that Narragansett Bay is divided naturally into several well-defined areas by the presence of islands and peninsulas. The author has taken advantage of this fact and for the purposes of comparison, has divided that portion of the bay from which oysters for analysis were taken into eight distinct areas. Some of these areas include rivers which flow into the bay while others include large portions of the bay itself. Oysters were taken from the beds situated in almost every portion of these well-defined areas and at various intervals during the summer of 1912, so that any comparison that may be made between the various districts in the bay seem to the writer to be both reasonable and fair.

Plate I shows the divisions into which the author has divided the bay. A brief geographical description of each district will follow together with its likelihood of being polluted as might be judged both from bacteriological examinations and a superficial sanitary survey.

District I.

District I includes what is known as the Kickemuit River, a small shallow stream flowing into Mount Hope Bay from the north. Because of its shallowness and protection from winter storms, this river offers an ideal place for the cultivation of oysters. Extended bacteriological examinations have shown this river to be a variable locality. The examinations of one period showing the oysters to be of a high sanitary quality in so far as the presence of fecal organisms is concerned while only a few days later, examinations have revealed gross pollution. As there are no towns on its banks, this pollution must necessarily come from Mount Hope Bay. At the present time, it is thought that the wind and tide play a very important part in the varying conditions of this river.

District II.

This district includes Mount Hope Bay and extends from north to south from the state line to Bristol Ferry. The bay has two outlets one emptying into Narragansett Bay at Bristol Ferry while the other opens into the Sakonnet River. Bacteriological examinations reveal the oysters from Mount Hope Bay to be grossly polluted during the greater part of the year. This condition might be expected since this bay receives the sewage of the City of Fall River and of the cities and towns along the Taunton River.

District III.

District III is known as the Sakonnet River which is nothing more than an outlet for Mount Hope Bay. Being very wide, however, and near the ocean, its waters are greatly diluted and as a result, we find the water of the Sakonnet River to be in a relatively high state of purity bacteriologically.

District IV.

District IV includes all the beds situated in Bristol Harbor and in the waters west of the Island of Rhode Island. Repeated bacteriological examinations have shown this region to be open to great pollution as it is the meeting place of the waters of Narragansett Bay, Bristol Harbor and Mount Hope Bay.

District V.

District V includes the beds in the Warren River which for the greater part of the year are subject to gross pollution.

District VI.

District VI may be designated as that region where the Providence River merges into Narragansett Bay. Bacteriological examinations show evidences of pollution.

District VII.

This district known as Upper Narragansett Bay although open to more or less pollution from the Providence River seems to be almost able to care for about all the pollution which reaches it. Examinations have revealed pollution but not in quantity.

District VIII.

District VIII includes that portion of the bay directly south of District VII and will be designated as Lower Narragansett Bay. Bacteriological examinations have failed to reveal evidences of much pollution.

In summary of the above description, the eight districts or areas may be roughly divided into three main classes as to their possibility of becoming polluted.

TABLE II.

CLASSIFICATION OF THE EIGHT DISTRICTS.

A. Open to Gross Pollution:	
Mount Hope Bay	District II.
Bristol Harbor	“ IV.
Warren River	“ V.
Providence River	“ VI.
B. Variable Locality:	
Kickemuit River	District I.
C. Relatively Free from Pollution:	
Sakonnet River	District III.
Upper Narragansett Bay	“ VII.
Lower Narragansett Bay	“ VIII.

From the various beds which happened to be situated in the designated sections, oysters were taken to the laboratory and examined bacteriologically as outlined in the early part of the paper. In the following tables, are compiled the results obtained by recording the presence of gas in the lactose peptone bile tubes at the end of the 24-, 48- and 72-hour periods.

TABLE III.

NUMBER OF LACTOSE PEPTONE BILE TUBES SHOWING GAS FROM DISTRICT I.

KICKEMUIT RIVER.

Bed.	24 hours.	48 hours.	72 hours.
1	0	7	6
2	1	16	0
3	0	15	0
4	2	15	1
5	0	17	4
6	0	18	5
7	1	26	1
8	0	0	20
9	0	9	15
10	0	2	11
11	2	17	4
12	0	28	0
13	0	25	2
14	0	18	2
	6	213	71
Per cent.	2.0	73.4	24.4

TABLE IV

NUMBER OF LACTOSE PEPTONE BILE TUBES SHOWING GAS FROM DISTRICT II.

MOUNT HOPE BAY.

Bed.	24 hours.	48 hours.	72 hours.
1	4	10	2
2	1	21	1
3	0	10	0
4	0	10	2
5	1	6	1
6	1	6	0
7	9	6	0
8	1	10	2
9	0	16	1
10	6	6	0
11	0	12	1
12	12	3	1
13	3	18	1
14	5	24	0
15	0	3	3
	43	161	15
Per cent.	19.6	73.4	6.8

TABLE V.

NUMBER OF LACTOSE PEPTONE BILE TUBES SHOWING GAS FROM DISTRICT III.

SAKONNET RIVER.

Bed.	24 hours.	48 hours.	72 hours.
1	0	0	1
2	0	2	4
3	0	1	5
4	0	1	5
5	1	3	4
6	0	3	3
7	0	1	4
8	0	9	4
9	0	13	2
	1	33	32
Per cent.	1.5	50.0	48.4

TABLE VI.

NUMBER OF LACTOSE PEPTONE BILE TUBES SHOWING GAS FROM DISTRICT IV.

BRISTOL HARBOR.

Bed.	24 hours.	48 hours.	72 hours.
1	0	9	0
2	0	19	0
3	13	15	2
4	0	14	1
5	13	8	4
6	0	16	0
7	0	20	0
8	0	19	2
9	0	4	3
10	0	9	0
11	0	9	6
12	0	10	8
13	0	6	4
14	0	4	4
15	2	7	4
16	2	3	1
17	2	21	0
18	0	4	1
19	3	5	8
20	1	22	3
21	0	28	0
22	0	30	0
23	0	30	0
24	0	30	0
25	0	0	15
26	0	13	2
27	0	4	2
	36	349	70
Per cent.	7.9	76.7	15.3

A careful study of Plate II brings out some very interesting points concerning the production of gas in lactose peptone bile. As stated earlier in this paper, a very small percentage of the tubes show gas by the end of 24 hours. We would naturally expect those districts which are open to gross pollution producing a larger percentage of tubes in 24 hours than those tubes inoculated with material from regions which are comparatively free from pollution. And such is the case. The arrangement of the districts beginning with the areas which show the largest percentage of tubes in 24 hours is as follows:

TABLE VII.

NUMBER OF LACTOSE PEPTONE BILE TUBES SHOWING GAS FROM DISTRICT V.

WARREN RIVER.

Bed.	24 hours.	48 hours.	72 hours.
1	0	26	0
2	1	17	2
3	13	11	3
4	5	10	0
5	0	11	3
6	0	25	1
7	0	18	2
8	0	23	0
9	0	11	3
	19	152	14
Per cent.	10.2	82.1	7.5

TABLE VIII.

NUMBER OF LACTOSE PEPTONE BILE TUBES SHOWING GAS FROM DISTRICT VI.

PROVIDENCE RIVER.

Bed.	24 hours.	48 hours.	72 hours.
1	2	26	0
2	2	12	5
3	1	13	4
4	0	19	2
5	2	17	1
6	1	8	4
7	8	21	1
8	0	13	7
9	0	17	1
10	0	10	4
11	0	13	2
12	0	5	3
13	0	21	0
14	0	30	0
	16	225	34
Per cent.	5.8	81.8	12.3

1. Mount Hope Bay.......................... 19.6 per cent.
2. Lower Narragansett Bay.................... 11.4

TABLE IX.

NUMBER OF LACTOSE PEPTONE BILE TUBES SHOWING GAS FROM DISTRICT VII.

UPPER NARRAGANSETT BAY.

Bed.	24 hours.	48 hours.	72 hours.
1	0	19	1
2	0	16	1
3	0	10	6
4	1	7	3
5	0	18	8
6	1	27	0
7	0	6	8
8	0	10	7
9	0	4	6
10	0	8	12
11	0	4	0
12	3	7	2
13	1	11	2
14	0	3	17
15	0	2	11
16	0	11	2
	6	163	86
Per cent.	2.3	63.9	33.7

TABLE X.

NUMBER OF LACTOSE PEPTONE BILE TUBES SHOWING GAS FROM DISTRICT VIII.

LOWER NARRAGANSETT BAY.

Bed.	24 hours.	48 hours.	72 hours.
1	1	15	12
2	3	12	1
3	0	5	6
4	0	5	5
5	4	5	0
6	0	5	2
7	10	1	0
8	0	9	17
9	0	4	5
10	0	0	10
11	0	4	12
12	0	0	7
13	1	1	6
14	0	0	5
15	2	0	9
	21	66	97
Per cent.	11.4	35.8	52.7

3. Warren River.......................... 10.2 per cent.
4. Bristol Harbor.......................... 7.9

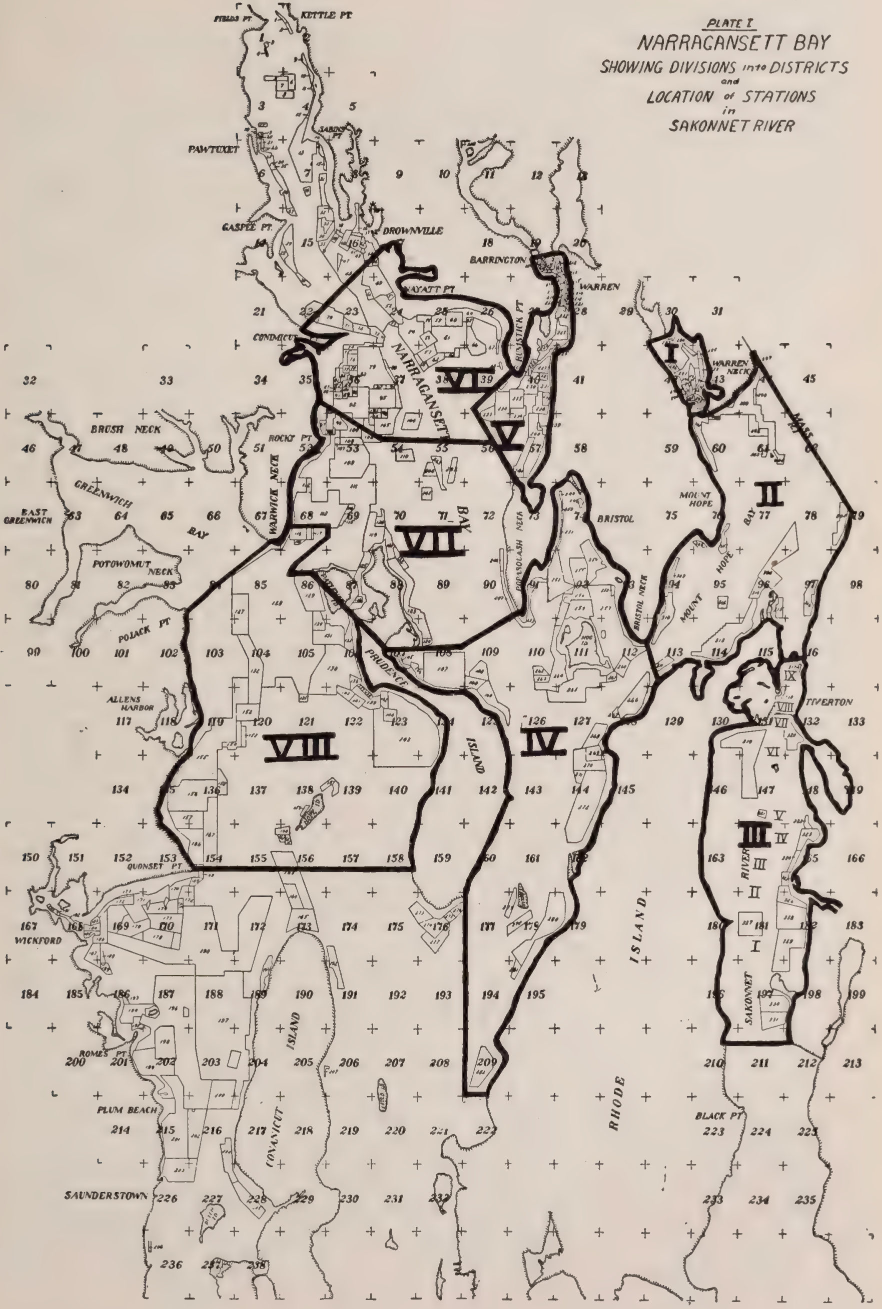
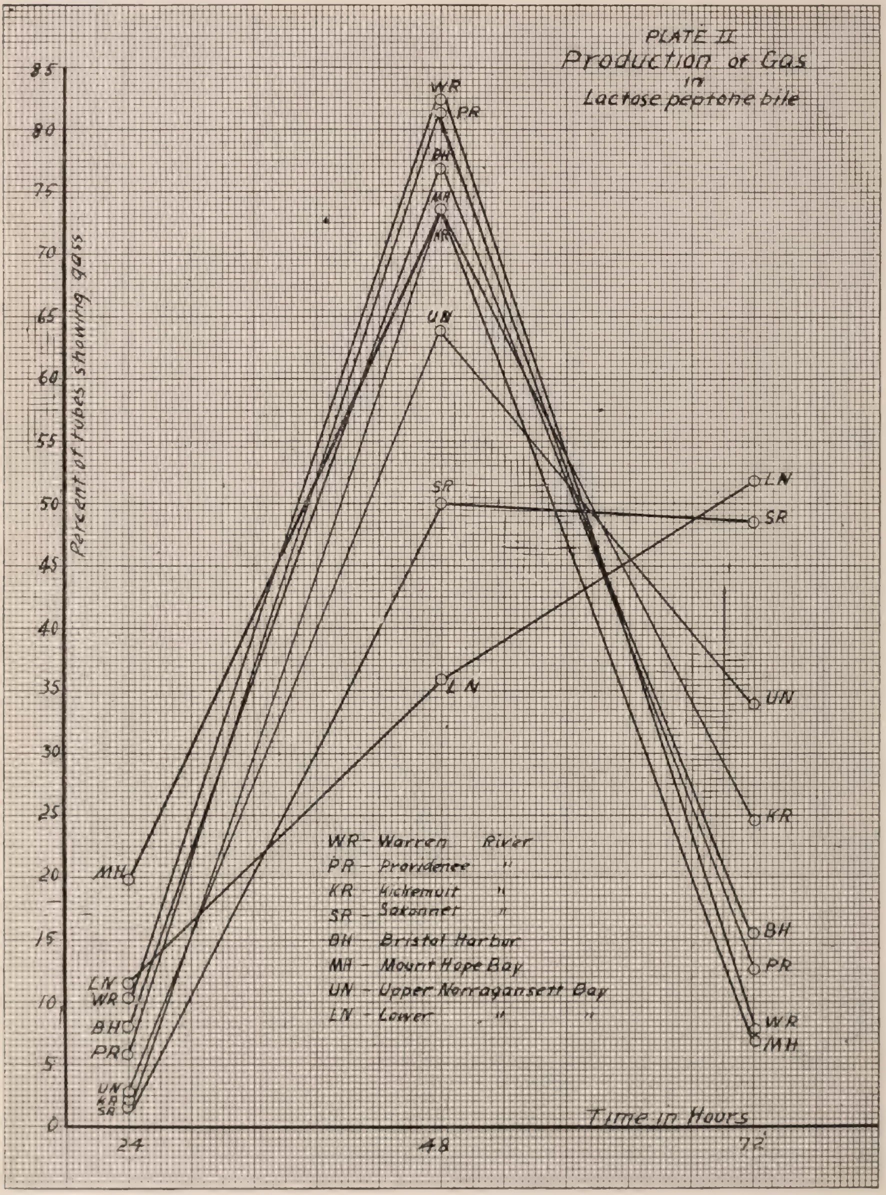


PLATE I
NARRAGANSETT BAY
SHOWING DIVISIONS into DISTRICTS
and
LOCATION of STATIONS
in
SAKONNET RIVER

5. Providence River	5.8 per cent.
6. Upper Narragansett Bay	2.3
7. Kickemuit River	2.0



8. Sakonnet River	1.5 per cent.

From this list it can be seen that districts like Mount Hope Bay, Bristol Harbor, Warren River and Providence River which are open to pollution roughly group themselves at the top of the list while districts which are distant from sources of pollution like the Sakonnet River, Kickemuit River and Upper Narragansett are found at the bottom of the list. The district designated as Lower Narragansett Bay has cast its lot with the polluted areas as a result of a polluted sample from bed seven.

This division is still more apparent at the end of the 48th hour. The arrangement of the districts beginning with the districts having the largest percentage showing gas at the end of 48 hours is as follows:

1.	Warren River	82.1 per cent.
2.	Providence River	81.8
3.	Bristol Harbor	76.7
4.	Mount Hope Bay	73.4
5.	Kickemuit River	73.4
6.	Upper Narragansett Bay	63.9
7.	Sakonnet River	50.0
8.	Lower Narragansett Bay	35.8

Here we find those grossly polluted areas showing a larger percentage of gas tubes than those districts which are comparatively free from pollution. For instance, the percentage of tubes showing gas from the Warren River is over twice that percentage shown by the gas tubes from Lower Narragansett Bay which now has taken its rightful position among the less polluted areas. The Kickemuit River which has by extended bacteriological examinations been proved to be a very changeable district, occupies a position in the center of the list as we should expect.

At the end of the 72d hour the arrangement of the districts in the order of percentages of tubes showing gas is quite reversed as the the following list will show:

1.	Lower Narragansett Bay	52.7 per cent.
2.	Sakonnet River	48.4
3.	Upper Narragansett Bay	33.7
4.	Kickemuit River	24.4
5.	Bristol Harbor	15.3
6.	Providence River	12.3
7.	Warren River	7.5
8.	Mount Hope Bay	6.8

Those regions which are comparatively free from pollution produce much larger percentage than regions which are open to pollution. At the end of the 48-hour period, the percentages of tubes showing gas from the Warren River was over twice as large as that percentage from the Lower Narragansett Bay for the same period. At the end of the 72d hour, the positions are reversed and the percentage of showing gas from the Lower Narragansett Bay is over seven times as large. The same comparison may be made between the other districts with the same result. The Kickemuit holds the same general position in the center of the list. Generally speaking those districts which were at the top of the list for the 24- and 48-hour periods are found at the bottom at the end of the 72d hour.

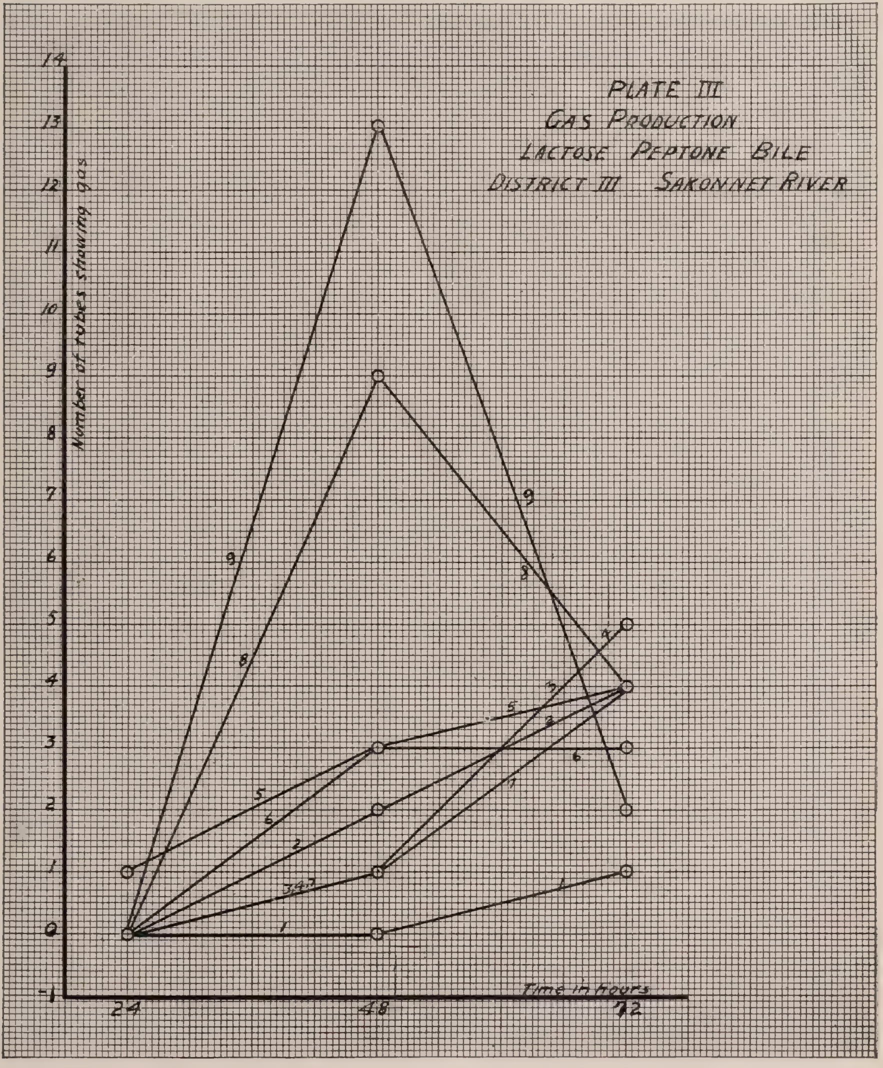
The only explanation of these results seems to the author to be that those districts which lie near the source of pollution must necessarily be exposed to vast numbers of healthy vigorous intestinal organisms which only recently have left their native haunts and when these organisms are placed in a suitable culture medium, like lactose peptone bile, a rapid growth with the production of gas must result. Hence, we find that the intestinal organisms isolated from oysters taken from polluted regions produce the greater part of their gas by the end of the 48th hour.

The beds which are situated in districts more remote from the sources of pollution present a different condition. The intestinal organisms which finally reach these beds, must certainly be in an attenuated condition and greatly reduced in numbers due to their long journey through the salt waters of the bay. Hence the growth of the organisms and with that, of course, the production of gas is retarded. The comparison between those districts near the source of pollution which produce the greater part of their gas by the 48th hour and those districts distant from the sources of pollution which produce the greater part of their gas after the 48th hour, may be seen in the following table:

District.	Gas produced at 48 hours in per cent.	Gas produced at 72 hours in per cent.
Mount Hope Bay	93.0	6.8
Warren River	92.3	7.5
Providence River	86.8	12.3
Bristol Harbor	84.6	15.3
Kickemuit River	75.4	24.4
Upper Narra. Bay	66.2	33.7
Sakonnet River	51.5	48.4
Lower Narra. Bay	47.2	52.7

From the above table it may be seen that the percentage of tubes showing gas by the end of the 48th hour decreases as we proceed from those districts open to gross pollution towards the districts which are free from pollution. At the end of the 72d hour things are just opposite. The percentage of tubes which show gas increase as we proceed from the greatly polluted towards the less polluted areas. With the exception of the Lower Narragansett Bay District over 50 per cent. of the tubes show their gas by the end of the 48th hour.

This same conditon was found to be true for the Sakonnet River which is really an outlet for the waters of Mount Hope Bay from which it receives the greater portion of its pollution. The town of Tiverton also contributes a small part. During the summer nine samples of oysters were taken from different portions of the river ranging from the point of greatest pollution near Mount Hope Bay to those beds situated near the ocean. Those beds which were near Mount Hope Bay produced the greater part of their gas by the end of the 48th hour while those nearer the ocean showed



the greatest number at the end of the 72d hour. Plate III, Curve 1, represents the gas produced from oysters taken from beds nearest the ocean and so on up to Curve 9 which represents the gas produced by oysters taken from beds nearest the sources of pollution. The other districts of the bay, on account of the complicated sources of their pollution, would not lend themselves to this treatment.

From the data gathered together in this paper, one cannot help but be impressed by the strict division obtainable by recording the number of tubes of lactose peptone bile showing gas at the end of the 24-, 48- and 72-hour periods. Those tubes inoculated from oysters taken from highly polluted areas produce almost all their gas by the end of the 48th hour while those tubes inoculated from oysters taken from regions more distant from the source of pollution produce a greater amount at the 72d hour. The writer is of the opinion that this method might be used as a supplement to the regular oyster analysis in the determination of whether the contamination is recent or remote by considering the temporal conditions of gas production in lactose peptone bile.

SUMMARY.

1. Lactose peptone bile tubes inoculated with the shell liquor of oysters taken from 119 different beds of Narragansett Bay produce the greater part of their gas by the end of the 48th hour.

2. Tubes of lactose peptone bile inoculated with the shell liquor of oysters taken from polluted districts produce almost all their gas by the end of the 48th hour.

3. Tubes of lactose peptone bile inoculated with the shell liquor of oysters taken from regions which are comparatively free from pollution produce a larger part of their gas by the end of the 72d hour.

4. Consideration of this temporal factor in the production of gas in lactose peptone bile might aid in the determination of whether the contamination of oysters is recent or remote.

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

The quarterly meetings of the Massachusetts Association of Boards of Health was held at Gallup's Island, Boston Harbor, Thursday, July 31, under the presidency of Dr. Samuel H. Durgin.

On motion, the reading of the minutes of the April meeting was dispensed with.

Upon the recommendation of the Executive Committee the following members and officers of boards of health were elected to membership in the Association: Edith Beckler, bacteriologist, Wellesley Board of Health; T. F. Harris, inspector, Wellesley Board of Health; Dr. George Osgood, and Dr. W. F. Snow, Cohasset Board of Health.

The Executive Committee recommended the appointment of a committee of five by the President to prepare a revision of the by-laws and constitution for the purpose of increasing the efficiency of the Association, and to report at the next meeting.

It was moved and seconded that the recommendation of the Executive Committee be adopted. The motion was carried.

It was moved and seconded that the committee be requested to report in writing to the members of the Association, previous to the next meeting. The motion was carried.

Doctor Kennedy, in behalf of the New Bedford Board of Health, extended an invitation to the Association to hold its next meeting in New Bedford in October. The invitation was seconded and adopted.

REPORT OF LEGISLATIVE COMMITTEE.

In addition to legislation reported upon at the last meeting the following matters are of interest to local boards of health:

The attempts at reorganization of the State Board of Health were defeated.

All proposed milk legislation was defeated with the exception of one measure which penalizes the use of unclean utensils in handling and treatment of milk.

A new statute, chapter 743, provides that ice cream must contain at least 7 per cent. of milk fat. While this is but one-half of the Federal standard it is better than none. The enforcement of this act rests with inspectors of milk.

George E. Bolling,
Chairman.

PAPERS PRESENTED.

The following papers were then read:

Organization, Powers and Duties of the United States Public Health Service Today, by Dr. John F. Anderson, director of the Hygienic Laboratory of the United States Public Health Service, Washington, D. C.

A Recent Contribution by the Federal Government to Preventive Medicine, by Dr. Arthur Reed Perry, Washington, D. C.

An Experiment in Public Health Administration in Massachusetts, by Prof. Earle B. Phelps, Massachusetts Institute of Technology, Boston, Mass.

(These three papers with discussion are printed elsewhere in this issue of the JOURNAL.)

The following resolution was presented by Dr. H. Lincoln Chase:

Resolved, That the Massachusetts Association of Boards of Health extends congratulations to the United States Department of Labor upon the interesting and valuable report it has recently made on the Causes of Death Among Woman and Child Operatives in Cotton Factories, and urges further application of the same methods therein exemplified to inquiry in to causes and death in cities typical of industries other than that already so carefully investigated by the United States Department of Labor.

The resolution was seconded and adopted.

There being no further business the meeting then adjourned.

NOTICE TO M. A. B. H. MEMBERS.

WANTED: Copies of the JOURNAL OF THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH from 1891 t0 1903, inclusive. Any one having copies of which they wish to dispose or knowing of any one who may have such copies please communicate with

FRANCIS GEO. CURTIS,
Treasurer, M. A. B. H.

399 Hammond St., Chestnut Hill, Mass.

BOOK REVIEWS

Preventative Medicine and Hygiene. *By M. J. Rosenau. With Chapters on Sewage and Garbage by G. C. Whipple, on Vital Statistics by C. L. Wilbur and on the Prevention of Mental Diseases by T. W. Salmon. D. Appleton and Co., New York, 1913. $6.00.*

Medical Schools have long desired, and still desire, to have the whole subject of Public Health treated in minute detail in a single book, however large that book may be. The reviewer believes that the interests of sanitary science would perhaps be better served by giving the ordinary medical practitioner a much more broad and general treatment of fundamentals, sufficient for intelligent coöperation with public health authorities, leaving details to be considered, by those specializing in public health, in separate treatise of a really exhaustive nature. The demand for text-books covering the whole field in its minutiæ exists, however, and must be met. It is a termendous, an almost impossible task. The Germans meet it by Hygienes in ten volumes which are really libraries by different experts. English and American authors struggle with it, single-handed, usually unsuccessfully. Doctor Rosenau has followed the German custom to the extent of getting three recognized experts to write chapters on Sewage and Garbage and Vital Statistics and Mental Diseases. For the rest, his own unusually wide experience qualifies him perhaps better than any other American sanitarian for such a task and he has produced a sound and well-proportioned and scholarly work, quite admirable for its type, and almost, if not quite, justifying the type.

The reviewer must demur a little at the title of the book. The use of the term "hygiene" for the personal conduct of life, food, exercise, sleep and the like, and of "sanitation" for the control of the environment, water supply, air supply, food adulteration, waste disposal, etc., has been pretty generally accepted in this country. With hygiene in this sense, Doctor Rosenau does not deal and to sanitation he devotes about half the book. "Preventive Medicine" may well be used to denote the control of specific communicable disease, by isolation and preventive inoculations and "Preventive Medicine and Sanitation" would be a more accurate title for this work.

The first section of the book deals with the prevention of the communicable diseases and takes up each disease in turn, classifying them according to their portals of entry, an excellent plan, quite novel in a work of this type. The book begins rather abruptly, plunging directly into a discussion of smallpox. A brief introductory chpater on the sources and vehicles of infection in general (such as one finds tucked away in the first half of Chapter VI) would surely be helpful to the student. Smallpox, rabies, the venereal diseases and tetanus are considered first, as diseases having specific or special prophylactic measures. Under smallpox the reviewe notes with some surprise the statement that the virus may live for a considerable time on fomites and that toys, pencils, books, etc., may carry the infection. Venereal diseases are admirably treated as "the most pressing problem of preventive medicine that confronts us at the present day." Typhoid fever, cholera, dysentery and hookworm disease (spread largely through the alimentary discharges) and tuberculosis, diphtheria, measles, scarlet fever, whooping cough, mumps, lobar pneumonia, influenza, common colds, and cerebrospinal fever (diseases spread largely through discharges from the nose and throat) are discussed in the light of the most modern knowledge and with excellent judgment. In connection with typhoid a chronic carrier is defined as one who discharges bacilli for over six weeks, only half the time set by some of the best German authorities. It is good to see a brief chapter on the common colds which, as the author says, would be promoted "from the trivial into the rank of the serious diseases" if we could trace out the "sum total of suffering, inconvenience, sequelæ and economic loss" resulting from them. The chapter on Insect-borne Diseases is admirable, particularly in relation to plague preventive measures. There is a misprint in the table on page 187 of "typhoid fever" where "typhus" is meant. Miscellaneous diseases include infantile paralysis, chickenpox, glanders, anthrax, foot-and-mouth diseases, malta fever, leprosy and mental diseases (treated by Dr. T. W. Salmon). Doctor Rosenau's fairness and conservatism in dealing with the mooted questions of the etiology of poliomyelitis (in the solution of which he has been so actively concerned) are particu larly noteworthy.

Section II deals with Immunity, Heredity, and Eugenics. The discussion of immunity is excellently done but it seems somewhat doubtful whether the laws of Mendelian heredity and the methods of Biometry should be included in a book, already so loaded with a vast diversity of subjects, as a text-book of public health must necessarily be.

Section III on Foods again is admirable. In no other place so far as the reviewer is aware is there a treatment of this general subject which approaches Doctor Rosenau's in sanity and balance. The Pure Food Law is analyzed and explained, wtih examples of the various types of adulteration. Decomposition is discussed very clearly and the difference between technical and objectionable decomposition pointed out. Food preservation is next taken up and the dubious and conflicting evidence as to the harmfulness of the common preservatives summarized. The chapter on Milk is particularly good, as would be expected of the author on "The Milk Question of." Chapters on Animal and Plant Foods follow. In the latter pellagra is included for, in the opinion of the author, "the bulk of evidence indicates that it is caused by spoiled corn."

The fourth section of the book deals with Air and here again the modern developments of sanitary science for the first time find place in a text-book. One looks with interest to see if Doctor Rosenau has formulated any standards for minimum room temperature or for humidity and finds that he has wisely refrained from doing so. These are problems which must be settled by future experimentation. As a method of measuring illumination he gives only the exposure of sensitized paper, which is probably inferior to the photometer for measuring the qualities of light which affect the eye. In connection with Doctor Rosenau's discussion of his own results on the detection of specific proteid matter in air by the anaphylactic reaction it may be noted that two recent independent investigations carried on at the College of Physicians and Surgeons, New York, and at the College of the City of New York have failed to confirm the Harvard results. The reviewer is inclined to question the statement that "it is very probable that a decrease in mental and physical efficiency would result from a prolonged exposure to a vitiated atmosphere, even though it were kept dry and cool." Have we really scientific evidence to make it as yet even "probable" that a "vitiated" atmosphere has any effect at all when thermal conditions are properly controlled? These are all, however, minor criticisms on a chapter which is on the whole excellent. It is followed by a chapter on the Mechanics of Ventilation which is rather brief but perhaps sufficient for the medical student.

The sixth section of the book deals with soil and again the bogeys of the older sanitation are disposed of in a very satisfactory manner.

The next section on Water includes a full summary of the analytical procedure recommended by the Committee on Standard Methods of the American Public Health Association. Doctor Rosenau insists on the importance of the complete isolation of the colon bacillus which is not in accord with a growing practice among water bacteriologists. The view that all members of the group of organisms which form gas in lactose media are equally significant of pollution is pretty generally accepted today. In the chapter on Water Filtration is the most serious error in the book, the statement repeated in various froms that mechanical filtration is "still in the experimental stage." The reviewer is accustomed to tell his classes, as a bit of history, that this view was taught when he was a student. Today, however, the efficiency of mechanical filters has been amply demonstrated by bacteriological and epidemiological evidence at scores of plants. Doctor Rosenau apparently accepts the Mills-Reincke phenomenon, the decrease in the general death rate, outside of the intestinal diseases, by water filtration, without reserve. The additional data which he gives on page 806 in support of the Mills-Reincke theorem do not lend much weight to it. Of the eight cities cited three show a reduction in total death-rate quantitatively less than the reduction in typhoid death-rate and the city which shows the greatest reduction in total death-rate shows only an infinitesimal decrease in typhoid.

Professor Whipple's sections on Sewage and Refuse Disposal are exceedingly brief (27 pages and 4 pages respectively). They are, of course, sound and well proportioned and, like the chapter on Ventilation, perhaps give as much as can be expected in a medical school. They are necessarily insufficient for the specialist in public health.

Doctor Wilbur's section on Vital Statistics contains an excellent discussion of registration laws and their enforcement, and a good treatment of the fundamental data of population. One misses, however, an analysis of special rates and ratios such as are used in dealing with infant mortality and industrial tuberculosis and, particularly a discussion of statistical fallacies, to which the medical man and the sanitarian are often so unfortunately prone.

Sections X and XI deal with Industrial Hygiene and School Hygiene and are excellently handled. In the former the danger of ingesting lead compounds from fingers, and in other ways than through the air, is perhaps, underestimated and the problems of the dusty trades might receive a somewhat fuller treatment.

The last section deals with Disinfection and is largely a condensation of the author's book on Disinfection and Disinfectants.

Sanitary science has developed tremendously in many different lines during the last five years. Doctor Rosenau has presented in this book the latest and best opinion in the various fields of public health work and has knit the whole together into a clear and sane and well-balanced work. It should take its place at once as the standard text-book on public health for medical schools and it will prove an invaluable work of reference for the practical sanitarian.

C. -E. A. Winslow.

The New Public Health. *By Hibbert Winslow Hill, M. B., M. D., D. P. H., Director, Institute of Public Health, London, Ontario; Late Director, Division of Epidemiology, Minnesota State Board of Health. First published as a series of eleven monthly articles by the Journal-Lancet of Minneapolis, under the auspices of the Minnesota State Board of Health. 12 mo., 128 pages, Minneapolis, Minn.: Press of the Journal-Lancet, 1913. 50¢.*

The title of Doctor Hill's little book is perhaps somewhat misleading. The book is not, as might be imagined, a discourse on the various opportunities and duties of public health authorities, or a description of the detailed procedures to be employed in this field of work; it is, however, an able exposition of the latest scientific ideas concerning the control of the communicable diseases.

In essence, Doctor Hill teaches that the sources of the infectious diseases are no longer to be looked for in the condition of our general physical environment (as in the old public health), but in the *discharges from infectious persons.* These discharges now become the strategic point of attack, and the problem of health authorities becomes the location of infectious persons (including carriers and missed cases) and their supervision so their discharges do not reach new victims. The old ideas of the relation of filth to disease receive scant courtesy, and small emphasis is allowed measures affecting the individual's resistance as compared with those shielding him from infection. Five great routes of infection are noted—flies, food, milk, water, and contact—but while the author believes in the desirability of guarding these, he reiterates that the more fundamental effort is the supervision of infectious persons.

Among the valuable discussions in the book is that of the old and new epidemiological methods, a matter on which the author is by experience especially qualified to speak. The importance and practicability of locating missed cases and carriers is dwelt upon, this work being the function of "concurrent" epidemiology—that of contact outbreaks, and "the most powerful and practical weapon yet devised for *the abolition of the infectious diseases.*" In this operation unknown cases are located by searching the "zones of infection" indicated by known cases. As this search "is a problem not only solvable, but already solved, and already reduced to a routine basis," one cannot but wish that Doctor Hill had given a somewhat more extended exposition of the scope and nature of the "zones of infection."

Other illuminating discussions are devoted to contact infection, the public health engineer, the public health laboratory, and the public health statistician. Interesting chapters are also given over to the possibilities of individaul defense against infection, to the principles of community defence, and to the application of these principles as exemplified by tuberculosis. The author's position regarding health education in the broader sense will be received with some question, as he maintains that this is not a matter for health authorities, but for the professional teachers—in particular in the lower grades of the public school system. But Doctor Hill admits that such education will be at best of partial effectiveness, and one is unconvinced that the health department has not, or will not have, an important function in systematic, well-considered publicity.

In conclusion Doctor Hill points out that the new public health principles are now established, and questions why they are not yet more generally applied. In answer he states that it is chiefly because the general public still clings to theories that were beginning to be discarded in scientific circles twenty years ago. Two chief fallacies are mentioned—that infectious diseases come from "general bad surroundings," and that "general good health" protects against infection. These points of view are here vigorously combated. Applying the new principles Doctor Hill is confident of the result. "To do this properly means intimate attention and supervision of infectious persons by men who know their business and do nothing else. If one such man to every 20,000 persons began, tomorrow, everywhere, his work, infectious diseases in ten years would have vanished and would have become mere history."

Among pertinent passages which indicate the tone of the book are the following: "It is the ability to find the *private sources* of infection in *contact* outbreaks that makes epidemiology the pivotal factor of modern public health." (page 48); "Modern public health practice for the control of infectious diseases consists, not in the *physical surveillance* of whole communities, but in the *sociological study* of the *infected persons* in them." (page 48); "Some day the equally logical step should follow,—the holding of the community responsible [legally] for *all* infectious diseases, by *whatever* routes they travel, including contact." (page 73); "Much-abused, laughed at, neglected, he [the vital statistician] is, or will be, guide, map-maker, intelligence-department, all in one; he is, or will be, like the cost-of-production scientific manager of modern business, 'the most indispensable man on the staff.'" (page 95); "*No person energetic enough to advocate the abolition of the fly should hesitate a moment to advocate the far simpler, smaller, easier, and far more important work of abolishing those germs that alone can make the fly a danger.*" (page 116).

This book is written in lively style by a man who is alive to the theory of his subject and its possibilities for the future. It may be recommended to the public health official as suggestive and stimulating, and to the layman or social worker as distinctly informing.

Franz Schneider, Jr.

HEALTH DEPARTMENT REPORTS AND NOTES.

TO STATE AND MUNICIPAL HEALTH OFFICERS.

This new division of the Journal is specially designed to be of use to active Health Officers of the countries represented in the American Public Health Association. It will be unable to serve its true function unless the Health Officers are willing to coöperate by sending to the Journal copies of their reports, bulletins, new ordinances and personal information which will be of general interest. Furthermore it would be distinctly desirable if communications on subjects of general interest are submitted for publication in this division of the Journal. The management will further welcome any suggestions from Health Officers for the improvement of this division. All communications should be addressed to Selskar M. Gunn, Managing Editor, American Journal of Public Health, 755 Boylston St., Boston, Mass.

REPORTS.

Cincinnati, Ohio.

Dr. J. H. Landis, health officer of Cincinnati, Ohio, presents an excellent report of the work of the Department of Health for the year 1912. It is logically arranged and the facts are so concisely stated as to give the impression that so much has been done that it must be reported briefly if at all. The only exception lies in the fact that Dr. Landis' report covers some of the same ground as those of his subordinates but it is short and serves as a recapitulation or summary of the rest of the book.

Cincinnati has a population of 394,650 and spends less than twenty-two cents per capita on the Department of Health. It has a birth rate of 19.93 despite an adverse decision of the Ohio Supreme Court concerning the reporting of births. The death rate for 1912 is 16.34 per thousand which is the lowest since 1909. Among the chief causes of death are tuberculosis, pneumonia and organic diseases of the heart. The high tuberculosis death rate is said to be explained in part by the fact that many patients are attracted from outside the city by the prospect of free treatment at the tuberculosis hospital.

Among the steps toward increased efficiency in the Department is the diversion of $16,500 formerly used to pay an assistant school inspector and twenty-five part-time district physicians to the hiring of eleven district physicians on full time. It is estimated that this plan has brought about a 30 per cent. increase in efficiency. Another improvement initiated by the Division of Medical Inspection and Relief is the opening of low-temperature rooms and open-air schools for anemic and tuberculosis children. School nurses have proved to be such a success in supplementing the work of the school physician and in forming a connecting link between the school and the home as to warrant the employment of additional nurses for 1913. The average daily attendance at the six Infant Welfare Stations where milk is supplied shows an increase from 120 in 1911 to 228 in 1912.

The Division of Food Inspection has been able to reach the utopian state of affairs where the associations of meat-packers and dairymen have become its strongest backers in the crusade for pure food and complete and rigid inspection is carried on with the result that $241,519.61 worth of food was condemned in the past year. Among the dairies conditions have been improved by the increased number of inspections made possible by the use of a motorcycle. The score-card system of inspection is used and its educational value is supplemented by stereopticon lectures to dairymen and consumers on the proper handling of milk. A rather original plan is the so-called Kitchen Inspection which includes all hotels, oyster houses, lunch counters, public institutions, etc. A system of grading had been worked out and lists of the standing of the 550 kitchens in the city are published in the monthly health reports.

The Sanitary Division has brought about marked improvements in the sanitary conditions of barber shops and bake-shops by systematic and constant inspection, one policeman devoting his entire time to each class. Seventy arrests and prosecutions were made for expectorating on street cars and sidewalks; 6,524 letters and notices were sent out resulting in 6,008 nuisance abatements.

Although the work of the Laboratory Division was handicapped by crowded quarters and the plans for a new location, the number of samples examined during the year was 15,692. Agglutination reactions with B. paratyphosus and B. enteritidis have been introduced and reports on diphtheria swabs received before 2 P. M. are given out the same day the specimen is received. It has been found that milk samples taken on Sunday fall below standard much more frequently than through the week and it is supposed that the dealers are taking advantage of the day of rest on the part of the inspectors to add to their profits. This contains a valuable hint to other departments of health. In arrests made for adulteration of foods it has been found advisable to place a large proportion of the cases of the open docket or to suspend the fine on condition that the money be expended on certain improvements within a definite time limit. Under the auspices of the laboratory fifteen lectures, most of them illustrated with stereopticon views, have been delivered before various mothers' clubs, teachers' leagues, and public school children.

The whole report indicates activity and enthusiasm, combined with intelligent and up-to-date methods in every department of the work.

Richmond, Va.

Dr. Ernest C. Levy presents his seventh report as chief health officer and it is evident that it is a worthy successor to his preceding reports. The crude death rate of the city for 1912 was 20.78 and 18.56 if the non-residents are excluded. The death rate from preventable diseases was phenomenally low and gives direct evidence that the public health work done in this city is of the highest grade. The death rate from typhoid fever, malarial fever, measles, scarlet fever, whooping cough, diphtheria, dysentery, influenza, tuberculosis (in all its forms), and infantile diarrhea was 410 per 100,000, a decrease of 187 since 1907. It is interesting to note, on the other hand, that the death rate from cancer, apoplexy, heart disease, Brights disease, congential debility, suicide, legal electrocution, and other violence was 900 per 100,000 in 1912, an increase of 188 since 1907. The death rate from typhoid fever showed a decrease over that of 1911 being 16.8 per 100,000.

Doctor Levy gives his customary critical study of the typhoid fever deaths. A very great decline in the reported death rate from malaria is noted and it is pointed out that this is due to the fact that the diagnosis of malaria in the past has not been a true diagnosis and that probably most of the deaths formerly attributed to malaria were really due to tuberculosis. In connection with the prevention of diphtheria Doctor Levy reports on the special work of the medical inspector, Dr. C. C. Hudson, who on his routine visits to report cases of diphtheria examines all other children in the house and wherever a sore nose is found a swab is taken. In this way Doctor Hudson has detected nearly twenty cases of chronic nasal diphtheria, none of which had been previously recognized.

With regard to scarlet fever, Doctor Levy emphasizes the point that this disease is more dreaded by the public, and, indeed, by most physicians, than is measles. As a matter of fact in Richmond there have been but forty-one deaths from scarlet fever in the past twenty-six years while measles has been responsible for 196 deaths during the same period.

An attempt was made to fight measles by the closing of schoolrooms in which the measles had appeared for a period of five days, that is from the ninth to the fourteenth day after the day on which the reported case was attending the school in question. It was found, however, that to follow this plan would have meant complete disorganization of the public school system and, instead, it was agreed by the school and health authorities that the health department would notify the teacher in each instance on what days she must be especially on the lookout for children affected with this disease.

There were 270 deaths from consumption, showing the lowest death rate from this disease with one exception. Doctor Levy expresses his belief that the tuberculosis death rate is really decreasing more than figures would indicate and refers to the fact that the death rates from malaria, pneumonia, and bronchitis have steadily declined, indicating that cases of tuberculosis are now being more correctly certified on the death certificates. The excellent work on the milk supply has been continued; the average dairy score for the year 1912 being 82.5. The average score for the year 1907 was 50.4.

The birth rate was 23.49. Doctor Levy states that in all probability they are receiving at least 90 per cent. of all births. The death rate from infantile diarrhea was 101.1 per 100,000, the lowest rate recorded since the reorganization of the Health Department in 1906. It is interesting to note in connection with the special work being done on the prevention of infant mortality that the death rate among 1,338 infants under observation of the Health Department was 6.7 per cent. while the death rate of the entire 3,069 births was 17.2 per cent. The results seem to have been most excellent although Doctor Levy wisely points out that it is impossible to make any exact statistical comparison. The completion of sewers enabled the Department to do away with 1,375 dry closets during the year and the special work of seeing that those closets which remained in the city were kept in proper sanitary condition was continued. Special reference is made to the work on flies and educational methods used to reach the public.

The net cost of the health department for the year was $43,176.23. An unusually full and excellent financial statement is furnished.

Doctor Levy emphasizes very strongly in his concluding sentences that the good results recorded could not have been obtained without the earnest and intelligent coöperation of his staff and the perusal of the various reports of the bacteriologist, medical inspector, sanitary inspector, and others gives every evidence of the closest kind of coöperation amongst the entire Health Department. Space does not permit referring to the excellent reports of the subordinate officers.

Doctor Levy's report should be read by every health officer. It is a mine of information and inspiration.

Spokane, Wash.

The report of the Department of Health of Spokane, Wash., for 1912 is presented by Mayor Hindley, president of the Board of Health, and Doctor Anderson, health officer. Spokane claims a population of 120,994 and supports an active staff of fifteen members working under the health officer, and an isolation hospital with a staff numbering seven. During 1912, 1.14 per cent. of the city's total expenditures was for health work making a cost of about twenty-eight cents per capita. While the statement of the death rate is omitted it appears to be 8.48 per thousand. The Board of Health appears to be giving excellent service for the small sum expended.

Mayor Hindley opens the report by calling attention to the true function of the Department of Health as an educational organization, rather than a branch of the Police Department and hopes that this view may be impressed on the minds of the people so that they may coöperate in the movement for a cleaner and healthier city from the standpoint of civic pride instead of from a fear of police coercion. Recent successful innovations are a modern well-equipped isolation hospital which is said to be so attractive that patients wish to return to visit it, in contrast to the old, repulsive "pest-house"; the quarantine nurse whose duty is to visit quarantined homes and assist and instruct those in charge; the municipal dentist who has replaced the dental clinic conducted by the Dental Society and who takes care of cases of children from public institutions when certified by the institutions or the Dental Society.

Active work is being carried out under the health officer in the inspection of sources of food supply, including bakeries, markets, restaurants, and dairy farms and systematic inspection, combined with educational methods have brought about great improvement in the general conditions. The Meat and Market Division, following the custom of annual reports, points with pride to the thousands of pounds of food condemned during the past year and the relatively small number of prosecutions.

The mortality report shows organic diseases of the heart (international classification 79) to be the principal cause of death with a rate of .801 per thousand; cancer (39–45) next with .718 per thousand; and tuberculosis (28–34) and pneumonia (91–92) following with .669 and .661 respectively. The birth rate is 16.02, stillbirth rate .602 and death rate 8.48, as stated.

The report closes with a statement of the meteorological data for the city in the past thirty-one years and a very interesting and readable explanation of and commentary on the tabular statement. This last is prepared by Mr. Stewart, the local forecaster and is a valuable addition since it not only explains much that is not generally understood by the ordinary citizen but also emphasizes the relation between weather and the public health.

Lowell, Mass.

Dr. Pierre Brunelle, chairman of the Board of Health of the city of Lowell, Mass., presents the annual report for the year 1912. Lowell claims a population of 106,294, a figure which is identical with that of the past two years. The cost of the Health Department to the city was sixty-three cents per capita during 1912. The death rate was 17.79 per thousand which is the lowest figure for twenty-three years with the exception of 1904 when the rate, 16.61 was based on an overestimated population. The death rate from cholera infantum also shows a notable decrease but the total infant mortality shows an increase over the two preceding years.

About a fifth of the space in the report is devoted to a consideration of the epidemic of so-called scarlet fever of which 873 cases were reported. The discussion of the epidemic is not very conclusive and covers an unnecessarily large amount of space. Doctor Brunelle doubts the correctness of the diagnosis in many of the cases and suggests that many of them were only "sore-throats" and "skin rashes." He implies that the epidemic was encouraged, given publicity, and generally "boomed" by his political opponents at the time of the winter election and that those who did not associate or come in contact with the opposition newspaper escaped the virulence of the infection. Another interesting feature is the argument which apparently seeks to prove that the old can and measure system of distributing milk is more sanitary than the use of bottles. Following another revolutionary line of reasoning the milk inspector propounds the opinion that in a city the size of Lowell where most of the milk reaches the consumer within thirty hours after milking pasteurization is rarely necessary; these "rare" occasions presumably being after an epidemic of scarlet fever or typhoid has broken out and been traced to its source.

The report is poorly arranged so that it is difficult to locate any desired piece of information. In addition, a large quantity of apparently useless material is introduced such as a list of the names of the horses and the number of harnesses, curry-combs and bottles of horse medicine belonging to the department. The only notable innovation of the year is a "Temporary Contagious Hospital" which has been arranged in a cottage on the city grounds. Routine work in milk inspection is carried out and samples are analyzed for butter fat and total solids; 350 examinations of milk sediment were made and it is said that "staphlococci, diplococci, bacilli, and in a few cases streptococci were found." The inspector of meats and provisions condemned ten pieces of meat as unfit for food. The tenement house inspector reports 912 inspections during the year but fails to report any other work accomplished.

NOTES.

Important Decision in Regard to Dirty Milk.

"A milk dealer in the city of Washington was tried before the police court of the District of Columbia for having sold milk that was adulterated, in that it "consisted in whole or in part of filthy, decomposed and putrid animal and vegetable substance" and had thereby violated the National Food and Drugs Act. The milk in question contained large numbers of colon bacilli and streptococci, indicating insanitary production or handling of the milk. The defendant was found guilty and appealed, but the Court of Appeals of the District of Columbia sustained the conviction in a decision rendered February 25, 1913. Mr. Justice Van Orsdel in delivering the opinion of the court stated in part as follows:

" 'The facts established by the evidence are that on February 27, 1911, a pint bottle of milk was purchased from one of the defendant's wagons, and taken to the laboratory of the Bacteriological Bureau of the Health Department, where it was analyzed and found to contain 4,500,000 bacteria on ordinary agar, 37° C. grown for 24 hours, and 89,400,000 bacteria per cubic centimeter. On ordinary agar, 25° C. grown 48 hours, it contained 83,000 bacteria per cubic centimeter of the colon group. It showed gas fermentation in one ten-thousandth of a cubic centimeter, approximately 15 drops and one streptococcus to one ten-thousandth of a cubic centimeter.

" 'It appears that the bacterium known as B. coli or colon bacillus originates in and is a normal constituent of the colon of all warm blooded animals, is discharged in the excreta and found in milk as the result of fecal contamination. When present in milk it always occurs from either direct or indirect fecal deposit therein; directly from carelessness in permitting particles of feces to get into the milk during the process of extracting the milk from the cow, or in handling it afterwards; indirectly, from dust, vegetation, water and air, where the bacillus is found—originally derived, however, from animal feces. The evidence discloses the state of the science to be that colon bacillus is a vegetable formation originating in animal intestines, and nowhere else. It is not found in air, dust, water or vegetation under conditions indicating different origin or its original derivation from the substances with which it is thus associated. Under favorable conditions colon bacillus will multiply and develop in milk with great rapidity. The present analysis, in the light of the evidence, reveals the presence of colon bacillus to have resulted from a direct deposit of feces in the milk, due to uncleanly methods in handling the milk.

" 'It is urged that since it is impossible to produce milk entirely free from bacteria, the statute imposes a duty impossible of performance, and cannot, therefore, be applied to milk; or, if possible of performance, it could only be complied with at so great a cost as to result in the destruction and confiscation of the business. It is not clear from the evidence that the enforcement of the act will produce this result. The present case does not present this difficulty, except in theory; since the contamination was so great as to place it within the statute beyond the domain of speculation. Not only did the milk in question contain bacteria of the colon group, but, as incident thereto, fecal matter, all of which, it appears, may be eliminated by the adoption of cleanly methods in handling the milk. In fact, it appears that samples from the dairy of plaintiff in error have been analyzed, which were free from bacteria of the colon group. One witness testified that he has encountered milk, samples of raw milk and samples of pasteurized milk, free from bacteria of the colon group; has seen samples of defendant's that did not contain them, milk sold as raw milk and analyzed on that assumption.

" 'We are not dealing with a regulation relating to milk alone, but with an act generally regulating the sale of food products. Milk is a food product; and, if found to be impure, it will be held to be "adulterated" within the provisions of the act. There is evidence that it is impossible to produce raw milk which does not contain bacteria; that a limited number of bacteria in milk are practically harmless. It is unnecessary to decide whether, under such circumstances, milk would be held to come within the act, since in the present case adulteration is clearly established. The dividing line between pure and impure or adulterated food is in each instance a question of fact; but, because of the scientific distinctions involved, and the impossibility of producing raw milk entirely free from bacteria, it may be much more difficult of ascertainment in the case of milk than of other food products. Owing to the great difficulty which may be encountered in justly enforcing the law, in the absence of a fixed standard defining what is marketably pure and impure milk, in a case where the adulteration consists alone in the presence of comparatively small numbers of so-called harmless bacteria, it may well be that Congress should give attention to this subject, as has been done in many of the States, and establish a fixed standard for marketable milk, whereby milk found to contain a greater number of bacteria than that fixed by the act should come within the condemnation of the law.'

"This decision is of importance to the city of New York, not only in-so-far as that part of its milk supply which comes under the domain of interstate commerce is concerned, but also in regard to that part of the supply which is not so governed. Subdivision 8 of section 53, of the Sanitary Code of the Department of Health, states that milk shall be regarded as adulterated 'which has been diluted with water or any other fluid, or to which has been added, or into which has been introduced, any foreign substance whatever, or which consists in whole or in part of filthy, decomposed or putrid animal or vegetable substance; or if it is the product of a deceased animal.' This section is, therefore, supported by the decision quoted above."

Bulletin, Department of Health, New York City, August 9, 1913.

New Form of Sanitary Privy.

"The need of a more satisfactory method for the collection of human excreta in places where modern sanitary plumbing is not available is often keenly felt, especially when it is necessary to supply it at a cost that is within the means of the ordinary householder, as well as within the means of the average municipality as regards the expense of collection and transportation to a suitable disposal point. As our knowledge increases it is becoming more and more apparent that human excrement is intimately associated with the spread of diseases, especially such diseases as typhoid fever, hookworm disease, summer diarrhœa of children, dysentery, and others, so that to protect excreta from flies and insects, as well as to obviate odors, is a prime requisite.

"In the past, boxes which inclosed the pails have been frequently used; but these were often found to be unsatisfactory because the wood became impregnated with odors and, owing to the constant dampness, there was a tendency to rotting of the wood, all of which gave rise to very disagreeable and persistent smells. Others have advocated the use of screened outhouses in which receptacles could be placed, but the screens are very likely to become useless through deterioration, and cracks and crevices which admit flies almost inevitably appear in such buildings.

"The new design has many advantages not found in other methods, and at the same time it meets the needs of economy, as well as overcomes the objections which have been mentioned. The pail, of which a drawing follows, has already been used very successfully in the Philippine Islands. The details of its construction are shown in the accompanying drawing.

"The frame is made, preferably of hard wood, and consists of four posts, set into a well-mortised frame. The posts are made of such height that, when the seat is placed upon them, an ordinary five-gallon kerosene can may be slipped into the side of the frame and be close enough to the bottom of the seat to prevent the entrance of flies. The post at the back of the frame comes through so that it may serve as a handle by which the closet may be moved from place to place and it also serves the purpose of making the lid self-closing. The can rests upon two cross strips, by which the close fit of the top of the can to the underside of the seat can be readily secured by either planing down the cross pieces when the can fits too tight or replacing them with thicker ones when it fits too loose. By this simple expedient the fit of the can need not be dependent upon absolutely accurate workmanship on the frame. The hole in the seat is cut diagonally because it makes the use of the closet more comfortable as the feet can be put back. The hole is covered with a hinged seat, which is made self-closing by the projection which is put on the post which comes through the seat. The entire woodwork is sandpapered and then well varnished.

"The closet has the advantage of being entirely open, which fact secures good ventilation and leaves no opportunity for the collection of dirt and retention of disagreeable odors which are so common in the boxlike designs heretofore used. The entire frame can be readily cleansed. It is light, easily moved about, and where there is nothing better available can be used as a commode for a sick room.

"On account of the light weight of the can as compared to the wooden pail, it is a much more simple matter to provide for an inexpensive daily collection system. The ordinary cart is admirably adapted for this service and can haul many more cans than it could pails, so that the cost can be kept down to a point which makes it possible to use a suitably located central pit or other means of central disposal. An ordinary night-soil pail costs from $3 to $5, while a kerosene can may be obtained generally at a cost of not to exceed 10 cents. This makes it practicable to use a new container frequently. A wooden pail also has the disadvantage of retaining and giving off odors, which a can has not.

"The cans should be collected every night and replaced with clean ones. The can, as soon as it is removed from the frame, should be immediately covered with a cover of the type shown in the plate.

"The closet also has the advantage of being complete in itself. From a sanitary standpoint it is safe to use it anywhere; in an outhouse, barn, or any place not objectionable from an æsthetic standpoint."

United States Public Health Reports, July 25, 1913.

Insurance Against Small-Pox.

The following note from the *Jennerias*, now incorporated with the *Medical Officer*, should interest the anti-vaccinationists and if the practice spreads may afford an opportunity for those especially rabid members of the clan who still maintain that vaccination is worthless to make very considerable amounts of money.

"A member of the Association of Public Vaccinators writes advocating a scheme for insurance against small-pox. In his own practice he has already adopted the plan. For the past eleven years he has offered, in connection with every vaccination showing four good vesicles, £50 if small-pox is contracted within ten years. He also gave a written undertaking when small-pox was prevalent in his district to pay a sum of £800 to the person (re-vaccinated) who visited the small-pox hospital daily in the event of his contracting small-pox. This gives the lie direct to statements often mady by anti-vaccinators that no vaccinator has the courage to back his opinions in this manner."

A Rural Campaign Against Tuberculosis.

"As a result of an experiment made in Wisconsin last summer, motorcycles are employed in the Badger State to good advantage in the crusade against the Great White Plague. A rural campaign has been put on by the use of a motorcycle which is believed to be a unique venture of its kind.

"Two health crusaders, a lecturer and an assistant, work together. They would compare with a knight and his squire of olden times, except that they both ride on one steed, a gasoline steed, and differ from the knight of old in that they are independent of the hospitality of castles or monasteries, for they carry a complete camping equipment, sleeping out of doors and doing their own cooking.

"The work consists of placarding the country with health signs and giving talks at creameries, country cross roads and small villages—wherever a crowd can be assembled. A village is usually chosen for an illustrated lecture in the evening. In working the surrounding country during the day time, the health evangelists advertise the evening lecture.

"Stereopticon views are a feature of this talk, which is usually given out of doors. The stereopticon is operated from the luggage carrier of the motorcycle, being connnected with the gas tank, which also supplies the headlight.

"The expense of this work is comparatively small, since hotel bills are eliminated. The ground can be covered rapidly and no time is wasted waiting for trains. As many people can be reached in the country in this manner as by the ordinary lecture tour through cities. After the schools open in the fall, a talk in each rural school will be made part of the program. This work can be carried on about six months out of the year."

Otto F. Bradley in the *American City*, August, 1913.

County Physician or County Health Officer —Which, Mr. Commissioner?

"There are no more 'county superintendents of health' in North Carolina. That official title was a bad one. It has fooled the people of many counties into believing that they were having a certain amount of health work done when, in ninety-five cases in a hundred, there was nothing of the kind going on. Since the first Monday in July, counties have had to choose between the employment of a county physician or a county health officer.

"If a county is interested simply in curing, or, perhaps better, treating or drugging its sick convicts and prisoners and its dependents in the county home, in having a few post-mortem examinations made for coroners, and having one or two lunatics examined a year for commitment to asylums, the official employed to do that work will be known as the county physician. The examination of the dead and crazy, and the treatment of disease in the defective and dependent portion of a county's population, is the least important service that a physician renders, and has nothing to do with health work, which is the prevention, not the cure, of disease. A person employed to do the work of a county physician has no more right to the title of health officer than has the coroner, jailer, or sheriff. He does not do health work.

"Where, on the other hand, a county employs a man to give 95 per cent. of his time to the work of preventing disease, to devising and executing measures to diminish the number of cases of typhoid fever and tuberculosis per thousand of the population each year, to hold down each outbreak of measles, whooping-cough, diphtheria, and scarlet fever to a minimum of secondary cases, and, in short, to decrease the death rate—the number of people dying per thousand of the population each year—such a man will be known as the county health officer.

"County physicians are the officials who practise medicine and give what little time is left to looking after almshouses, county jails, and convict camps. In taking care of their own practice and in serving the public there is a suggestion of a man's serving two masters. A large number of county physicians in North Carolina are overpaid.

"A county health officer is a man who is not allowed to do private practice. He gives his entire time to the public; his work will be supervised and checked every month by a state official, and the amount of his work compared with the amount of work done by the other whole-time county health officers. The comparative work of whole-time county health officers will be published monthly in the county papers of those counties employing whole-time men. The death rates of a county at the beginning of a whole-time health officer's tenure of office and at the expiration of his term of service will be published, and the people can see whether there has been any decrease in the death rates—that is to say, whether there has been any health work done. The whole-time man serves only the public; he is not serving God and mammon. The whole-time health officers in North Carolina are much underpaid.

"Let county commissioners recognize the difference between county physicians and county health officers; employ the latter, and throw away the former; see that some real health work is done in their county. The state laws no longer permit the people of a county to be deceived by that two-faced title, county superintendent of health, which heretofore has been applied to both county physicians and county health officers."

W. S. Rankin in *Bulletin North Car lina State Board of Health.*

Measures Designed to Assist in the Control of Scarlet Fever and Diphtheria.

The inspection of school children in Oskaloosa (population 1910, 9,466) by the health officer was authorized by the Board of Health of Oskaloosa in 1912. The health officer has been attending to this work in addition to the other duties of his office and during the past year only gave attention to the detection and control of communicable diseases among the children. Lack of assistance has handicapped the health officer considerably and so far has narrowed the scope of the work. At the recommendation of the health officer the Board of Health adopted the following two regulations designed to assist in the control of scarlet fever and diphtheria among the school children.

"Rule 1. All children absent from school for more than four consecutive days shall be examined by the health officer to determine their freedom from any contagious disease of the throat; if found to be free from any such disease or condition they shall receive written permission from the health officer before being admitted to school."

"Rule 2. All children seeking admission to the public schools of the city from outside the city shall be examined by the health officer to determine their freedom from diphtheria bacilli; and if free from diphtheria bacilli, the health officer shall give his permission for admission before any such children may be admitted to their classes."

According to the requirements of Rule No. 1 all children who have been absent from school for four consecutive days or longer are sent to the health officer's office at the City Hall for examination each morning. The children's throats are examined and they are questioned as to the reasons for their absence and, if ill, as to the nature of their illness. This is useful in finding cases of communicable diseases where physicians were not called, and which the parents might be trying to conceal. According to Rule No. 2 the freedom from diphtheria bacilli is determined by taking throat cultures, which are incubated and examined in the Municipal Laboratory.

Full coöperation on the part of all teachers has as yet not been secured in the enforcement of these regulations, and was responsible for an outbreak of scarlet fever in one of the schools. In this instance an unrecognized case of mild scarlet fever was permitted to return to school after four days absence without the health officer's certificate. This case was responsible for the development of nine cases.

As yet it is impossible to give figures as to the measure of assistance which these regulations will give, but with proper coöperation from the teachers these regulations will materially assist in the control of scarlet fever and diphtheria among the school children.

Mark F. Boyd, M.D., Health Officer, Oskaloosa, Iowa.

New York Smoke Ordinance Unconstitutional.

"In a suit recently brought by the Department of Health against the New York Edison Company in the Court of Special Sessions for infraction of section 181 of the Sanitary Code, which provides that "No person shall cause, suffer or allow dense smoke to be discharged from any building, vessel, stationery or locomotive engine or motor vehicle, place or premises within the city of New York," decision adverse to the department was rendered, and the demurrer of the New York Edison Company was allowed. Justice Russell handed down the decision, in which Justices Zeller and McInerny concurred."

In the decision the ordinance is said to be "unreasonable and arbitrary because of its unqualified and sweeping character, condemning as a nuisance a thing that may or may not be a nuisance, and because it makes no provision for cases where compliance is impossible." The court further states that the present ordinance, prohibiting, as it does, the emission of dense smoke, irrespective of reasonable definitions, limitations and qualifications, is a restriction upon the use of private property and repugnant to the provisions of the Federal and state constitutions that no person shall be deprived of his liberty or property without due process of law.

It is not the intention of the Department of Health to allow the question to rest with the decision above quoted. An appeal will be taken at the earliest possible moment, since the final adjudication of this matter is a matter of first importance to the community.

Analysis of 1,000 Cases of Epidemic Measles.

The American Journal of Diseases of Children for August contains an article by Dr. C. V. Croster of Rosebank, N. Y., on the study of 1,000 cases of epidemic measles occurring among emigrant children at Hoffman Island Isolation Hospital, from December, 1910, to August, 1911. The following, quoted from the latter part of the article, may be interesting to students of public health problems as demonstrating the true seriousness of measles:

"Of the 1,000 cases of measles the greatest number were in the month of June, 186.

"The third year age period shows the greatest incidence of attack, 195. The largest complication percentage, 81.3, and case mortality, 34.3 per cent., are found in the first year period.

"The seasonal prevalence of complication was highest in December, 78.6 per cent., and of case mortality in January, 25.2 per cent.

"It will be seen by Tables 1 and 2 that the greatest monthly percentage of complications occurs in December and January, showing that in every hundred cases of measles in those months, 78.6 and 72.8 per cent. of them suffered from complications. June, with the greatest number of cases, had a small complication incidence, 60.7 per cent. The incidence of complications for the age periods are shown in Tables 3 and 4. It will be seen that the one year age period shows the highest percentage of complications, in that every hundred cases of measles at that age had complication in 18.3 per cent. of them.

"The total number of deaths was 167; case mortality 16.7 per cent. The causes of death for the age periods are given in Table 5. By far the greatest number of fatal cases are due to bronchopneumonia in association with some other complication. With enteritis the number is the largest, 39; with diphtheria, 28; bronchopneumonia alone, 26; with otitis media, 17; empyema, 10, and enteritis alone, 6. The greatest case mortality is in the one year age period, 34.3 per cent. Table 4 . The first three age periods together show more than twice the number of fatal cases of all the other age periods combined. After three years the case mortality decreases enormously. Case mortality is nearly equal for both sexes. The greatest monthly case mortality occurs in January, 25.2 per cent., and February, 21.6 per cent. April has the lowest monthly case mortality, 9.5 per cent. Table 2.

"Pertussis was the most frequent of the sequelæ, 32 cases being recorded. Miliary tuberculosis occurred in four cases, with four deaths. A right-sided hemiplegia of face and eyelid was observed in a female child, aged one year, on the thirty-second day of the disease. Recovery took place.

"The most frequent complication was otitis media, 495.

"The most common cause of death, bronchopneumonia and enteritis, 23.3 per cent. of total deaths. Average duration of the fever, four days. The onset of purulent otitis media on tenth or twelfth days may not be attended by unusual fever. If the temperature remains high after the fourth day, a possible grave complication is imminent. An initial high temperature does not necessarily point to a possible severe attack."

The Cost of Homes.

The Bureau of Sanitation of the Cleveland Board of Health has been making a study of the cost of living in various sections of the city and has discovered an interesting, if not surprising, state of affairs existing. *The Survey* of July 26 discusses the work thus far accomplished as follows:

"Fourteen college investigators under Mildred Chadsey of the Bureau of Sanitation have been going after the facts in both sections. They show that it costs more to occupy hovels than homes. The rent per room is more in the poorer than in the better section.

"Here are the figures, boiled down from the reports of 1,569 houses in the poorer section and 2,355 in the better. The rent for one room is $3.50 in the slum district as against $3.46 in the section of real homes; for two rooms, $4.96 as against $4.67; for three rooms, $6.73 as against $6.60; for four rooms, $8.87 as against $8.85; for five rooms, $11.41 as against $10.83; for more than five rooms, $14.23 as against $14.83. In every case, except the last, it is cheaper, so far as rent is concerned, to live in a little home with trees and a garden in front and a yard behind than to live in the dirty, slovenly, cramped quarters of the Haymarket.

"A study of industries revealed that the opportunities for work are about the same in the two sections. Both are bordered by large factories. If there is any difference, it is that the factories in the outlying section experience more difficulty in getting help and hence offer a greater demand for workmen than the factories nearer the center of the city. It seems to be the old desire to live near friends and fellow countrymen rather than any real economic necessity that causes multitudes to crowd near the brightly lighted main streets of the city instead of living in the more quiet, open community of small houses.

"The cost to the city of bad housing conditions is being brought out in such sharp relief that it will not readily be forgotten. In one ancient wooden dwelling, for instance, fourteen families live. They all use the same water faucet in the yard and the same sewer vault. Recently measles entered this old house and spread from family to family until it became a veritable epidemic. Right on the heels of this came an epidemic of diphtheria which was followed by scarlet fever. For six months the house was kept in quarantine, with two sanitary officers constantly on duty at a salary expense to the city of $1,000.

"Such are the serious financial penalties for civic thoughtlessness—not to speak of serious moral and social penalties—that the investigation is bringing to light. The two sections are being compared as to morbidity and mortality rates, tuberculosis, juvenile delinquency and crime. The results will be tabulated in 'cost charts' and placed in a permanent health exhibit in the City Hall."

Health Education by Means of Motion Pictures.

"The Department of Health is now running in the nickel theaters of the more populous sections of the city, its educational motion pictures depicting (a) the summer care of babies and (b) the necessity for reporting births. During the last twelve days these picture lessons have been shown to audiences totalling 25,615 persons, or an average of 2,135 per day.

"As a means for reaching the people most in need of health instruction these pictures have been found most effective. Their particular advantage over other forms of educational endeavor lies in their ability to attract and hold attention and to be readily understandable to all nationalities, regardless of language.

"During the coming week these pictures will be on exhibition in the nickel theaters located in the ninth, tenth and twentieth wards."

Bulletin of the Chicago School of Sanitary Instruction, July 26, 1913.

Discontinuance of Removal of Bedding after Certain Infectious Diseases.

"After cases of diphtheria have been removed to the hospital during the height of the disease, or the patient has died during the same period, fumigation of the premises will be performed, but bedding will not be removed. After cases of diphtheria, which terminate in recovery, fumigation will be omitted and bedding will not be removed. The woodwork of the room in which the patient has been isolated must be thoroughly scrubbed with a hot soda solution, one-half pound to three gallons, and the room thoroughly aired for at least twenty-four hours before again being occupied.

"After death or recovery from scarlet fever, or after removal of the patient to the hospital, the premises will be fumigated but the removal of bedding will be discontinued.

"When cases of measles have died during the height of the disease or have been removed to the hospital during that period, the premises will be fumigated but bedding will no longer be removed. When cases of measles terminate in recovery the woodwork must be scrubbed with a soda solution as above described, but bedding will not be removed.

"After cases of cerebro-spinal meningitis and anterior poliomyelitis have been removed to the hospital during the height of the disease or have terminated in death during the same period, the premises will be fumigated but the removal of bedding will be discontinued. After recovery, the premises will be cleaned and scrubbed, but bedding will not be removed.

"In exceptional instances, as for example, when physicians or members of the patient's family particularly request that goods shall be removed for sterilization, the Borough Chief will direct that this shall be done provided he deem it advisable. In special cases where proper and efficient fumigation cannot be performed on account of the nature of the premises, bedding will be removed and disinfected. The bedding will also be removed as formerly after cases of small-pox, cholera, plague and yellow fever."

Weekly Bulletin of the Department of Health of New York City, July 26, 1913.

Acohol, and the Public Health.

"In his account of 'the influences and conditions, injurious or dangerous to the health' of the Burgh of Clydebank, Dr. T. M. Strang, Medical Officer of Health, publishes an out-and-out denunciation of the 'ease of access of the people to alcoholic drink.'

"After declaring that indulgence in alcohol produces a great and generally deleterious effect on the health of the burgh, he continues 'Could alcohol in all its forms be abolished from the community it could almost be guaranteed that the death-rate would fall 1 per 1,000 per annum at least. That the state of matters at present existent in this and other similar communities has been allowed to survive so long is a cause of wonder to anyone who is conversant with the facts to any small extent and reflects on them. The time of legislators is occupied in trimming the outgrowths of social evil which have risen largely from this root, but the root itself manages to get left alone or, at the best, simply restricted and regulated.

No municipalization, no disinterested management, will prevent people getting drink—and taking it home or elsewhere—as long as it is on sale anywhere. Would the absolute and sudden withdrawal of it from the community or country do anyone any harm? As a medical man, I know of no condition affecting bodily health which would be prejudiced by such a measure. What a different appearance our town has on a holiday when all the drink shops are closed by recommendation of the magistrates to what it presents on holidays when these are open. There is seldom a holiday time in which I do not see a death either from accident or otherwise which has been directly due to alcohol, but these deaths do not appear in our returns as due to alcohol—very few do. Not only are there direct deaths; we cannot compute with any accuracy the numbers of children who are starved and neglected and have their bodies reduced, so that they cannot resist disease when it comes, because their fathers and their mothers spend their means on drink. The lot of the laboring man is a hard one, and it is said he finds a solace in drink to be found in no other way; it is for him a sort of chloroform from misery and hopelessness. He soaks in it at every opportunity, reduces the powers of resistance of his body to disease and succumbs to pneumonia, bronchitis, or consumption, more readily than sober men. Most towns like ours have hundreds of such men, many of whom make as much as 7*s.* per day in ordinary good times, and are paid daily and drink nightly. Many of them live away from their families for the sake of this freedom for self-indulgence, while the families may be a charge on the rates of some distant parish. When these men take ill the usual thing is the parish doctor and the parish hospital and poor-house, at the public expense; the good wages have gone nightly into whisky. There is indisputable evidence given us by the life insurance companies, which keep separate records for total abstainers, that they live many years longer than even the moderate drinkers, their conditions of life being otherwise similar. With these reflections we welcome the evidence that public opinion is slowly but surely coming to the conclusion that drastic powers must be placed in the community's own hands, and there is little doubt that when the people wake up to the facts they will soon rid themselves of this canker.'

"Dr. Strang ends by declaring that there is no reason in making war on consumption, war on poverty and bad housing and sickness in all forms, and spending millions on it, without at the same time attacking this *causa causans* of all these evils."

The Medical Officer.

The Treatment of Cholera Carriers.

The Tropical Diseases Bulletin for July 15 reviews an article by Salimbeni and Orticoni on the treatment of healthy carriers of the cholera vibrio by enemas of specific serum. While the experiments quoted are not sufficiently extensive to show definite results they may be suggestive to those who are experimenting on methods of treating typhoid carriers. The review follows:

"During an epidemic at Marseilles in 1911 thirty-four persons in one asylum were found to be carrying the vibrios without showing any definite symptoms of cholera, although some had slight choleraic diarrhœa. All these were treated as follows: Each received an evacuating enema and from the fæces so obtained cultures were made. Immediately after this an enema of 50 cubic centimeter of cholera serum in 200 cubic centimeters of salt solution was slowly injected, attempt being made to let the injection penetrate as far into the intestine as possible. In 9 out of the 34 the vibrios had disappeared at the time of the first injection; in 22 of the remainder they disappeared within 2 days, and in the 3 others in 3 to 6 days after the injection. None developed cholera. The numbers are small, but in another hospital several carriers continued to excrete the organisms for 15 days, and at least 2 developed cholera and died; and the authors consider that the treatment is worth a further trial. In none of their cases could they detect the presence of cholera antibodies in the serum of the patients treated."

Prevention of Diphtheria Epidemics.

Dr. S. C. Lind, Medical Inspector of Public Schools of Cleveland, reports in the June number of the *Cleveland Medical Journal* two interesting cases in his experience where diphtheria epidemics were stopped by the identification and exclusion of carriers after fumigation had proved ineffective. His paper is quoted in part as follows:

"With the recent literature so filled with reports of diphtheria carriers, their menace to the community, and various methods employed in freeing them from the bacilli, it may be of at least local interest if a brief report is made of carriers discovered in two of our public schools. No sooner had the schools opened last fall than a veritable epidemic of diphtheria began. It will be remembered that from October until December there was considerable agitation both in the profession and among the laity over the large number of cases of diphtheria reported. The majority of those attacked were school children, which made the outbreak of peculiar concern to the school medical inspectors.

"Diphtheria first appeared in Scranton school, September 27, in Room 8, and except for one case developing after October 16, remained localized in this room. As soon as a case was reported vigorous fumigation was begun, work then resumed and still diphtheria developed. On September 27, two children were absent on account of diphtheria; three days later, two others did not come to school, while on October 3, a fifth was attacked. With the coöperation of the City Health Department it was decided to take cultures from the entire room. Four carriers were found, excluded from school, much to the disgust of the parents, and no other cases of diphtheria developed. As mentioned above, a child in one of the other rooms became ill with diphtheria. This, however, was the last case to occur in this building.

"With this experience in mind, a case of diphtheria having appeared in both the morning and afternoon kindergarten classes at Orchard school, routine throat cultures were again taken. Three carriers were discovered, one attending the morning session, while the other two were enrolled in the afternoon class. These children were excluded, and no further cases developed.

"Here is illustrated the folly of fumigating school rooms while diphtheria bacilli are harbored by the well. Taking cultures from even the youngest pupils was not difficult, and only in this way are we able to discover carriers. None of these children were ill at the time nor did they later become sick. Throat inspection in each instance showed a normal condition. The importance of routine cultures cannot be overestimated. The active, acutely ill case is not the one of greatest danger. Such a person is in bed and measures minimizing his danger to the well are taken. Quarantine is established and antiseptics are freely used. The healthy carrier is the real menace and he is a very potent factor in the spread of diphtheria."

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Rudolph Hering, D. Sc.,
New York City.

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It is with an unusually deep sense of appreciation that I deliver to you today the annual address of your President. This association was founded by, and during its early life consisted almost exclusively of, medical men, until within recent years men of other activities were called upon to assist upon the fields of public health. Among the new professions thus entering this domain was that of sanitary engineering. For the first time in the history of the association your President has not been a physician, but an engineer. This recognition of the engineering profession by calling it into partnership in the deliberations concerning public health questions has been greatly appreciated by it, and I desire to express this fact, and to add that this partnership with the engineer, whose duties embrace the practical ways and means of carrying into useful effect the results of medical science so far as they apply to public health, should result in large benefits to our people. And, personally, I cannot adequately express my feelings as to the depths to which I appreciate the confidence and the honor you have placed upon me by selecting me to represent my profession in this common cause. I can but devotedly thank you for this most highly prized distinction.

The engineering profession, in directing the application of the various materials and sources of power for the use, convenience and health of man, has in the last century proceeded with greater speed and vigor than ever before. The reason is, as Professor George F. Swain has said, that the engineer is an applied scientist, able to furnish necessities, comforts and even health to our people to an extent of which former generations never dreamed of nor thought possible. Engineers are, therefore, being brought in to help in directing aright the tendencies of the day. Based only upon known laws of nature, engineering has a firm foundation. Whether for sanitary or commercial purposes, it should, therefore, be reliable and make a safe partner in the field of public health.

Our entire social organization is in many ways now undergoing a bloodless revolution, and, as knowledge advances, readjustments are continuously being made. Education is being better understood and our youth is placed in a better position to attack the problems of life and to do it from more solid and safer bases than was formerly possible. Religion is becoming broader and more generous. It is extending into the field of practical ethics more rapidly than ever before, to point out the best rules of conduct within family and community. The realm of faith is making room for positive knowledge and this, again, is building a foundation for the belief that we are constantly progressing towards the highest ideals for which the human race is struggling.

As to our theories of government, we have lost those strong antagonisms between monarchy and democracy. Today empires and republics can hold and maintain faithful friendships. The most wonderful changes of all are found in the fields of industry. The harnessing of the powers of nature and their utilization for the needs of man, both for manufacturing and for transportation, has changed civilized life more than any other factor has done. The developments of production, of the means of transporting people and wares on land and water, have been marvelous, and that of transmitting our thoughts and desires by bridled electricity from one part of the earth to another is simply astounding. This rapid progress, due to advanced knowledge, is pervading every phase of civilization. It has also pervaded the realm of public health.

Let us go back for a moment and briefly review the history of public health. Hygienic regulations existed among the most ancient peoples. Moses took his prescriptions from Egypt and India. The Greeks were the first to introduce public water supplies, to dispose of refuse, to keep the human body clean by public bathing, and strong by concerted exercise. The Romans went still further, controlled the healthfulness of their food, introduced sewerage and better disposal of the dead. In the first thousand years of the Christian era of Europe, hygiene retrograded gradually until the twelfth and thirteenth centuries, when England and Germany began to control pestilence in the larger cities. In the fourteenth century some attention was beginning to be paid to general town cleaning, to food adulterations and to the systematic removal of excreta. In the fifteenth century at last there began the great modern uprising in the interest of public hygiene. The city of Venice, commercially the leading city of the world, established the first municipal organization for the protection of public health. Then followed slowly the larger cities of Germany, England and France.

The first attempts at public health service in the United States seemed to have been in Virginia in 1739 but were limited to regulating the practice of medicine and to the registration of vital statistics. Then came the official sanitary activity in Boston, brought about chiefly by smallpox. On May 27, 1796, a national law authorized the President to "direct the revenue officers and the officers commanding forts and revenue cutters to aid in the execution of quarantine and also in the execution of the health laws of the states."* One year later Massachusetts established the first town board of health and set the pace which has since covered almost the whole country.

At the time this association was formed—it was at a meeting of medical men in New York on September 12–13, 1872—the prevailing means of guarding public health were by quarantine, segregation, vaccination and cleanliness. Soon thereafter bacteriology developed and a new era of public health service at once was started. A number of infectious diseases were found to be caused by extremely small organisms which entered the body. An enormous multiplication therein produced the diseases, and when these had run their course, the organisms departed, ready to enter another body and repeat their destructive work. This discovery not only facilitated effective treatment and cure, but also the prevention of infection, which brought about achievements in the public health service that had never before been equaled.

The cause and treatment of yellow fever, that most dreaded of all infectious diseases of this continent, are now known, and no repetition of its destructive epidemics of the last century need be feared hereafter. We can say almost the same of cholera and bubonic plague, those morbific terrors which have on several occasions decimated European city populations.

Diphtheria has also in a large measure become controllable so that its rate of reduction due to an antitoxin treatment is phenomenal. Let us hope it may be but a short time before measles, scarlet fever, whooping-cough, mumps and other similar infectious disorders can be similarly controlled. The hook worm disease of our Southern States, much dreaded a few years ago, is now on the road to be eradicated. Typhoid fever can be very largely reduced and almost annihilated by supplying pure water and milk, by excluding from the market all polluted shell-fish, by cleanliness in food exposures, by fly elimination, by disinfection of fresh typhoid excreta, by supervision of human typhoid carriers and by vaccination as developed in the army camps of Texas.

The largest groups of preventable diseases yet remaining under some clouds of ignorance, because a direct remedy is not yet known, are tuberculosis and pneumonia. But even here great results have been accomplished by knowing the causes, by eliminating the conditions under which the diseases are aggravated, and by selecting conditions under which they may be reduced.

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*Public Health Bulletin, No. 54, by Dr. J. W. Kerr, assistant surgeon general.

Recent advances in the reduction of cancer and syphilis by bringing them largely under control make further advances towards cure more hopeful. Infectious diseases, one after the other, are being conquered, ignorance is being dissipated and scientific knowledge is gradually building up a firm and permanent structure of public health. If the advance in public health is measured by the lowering of the death rate, it has been marvelous, because in the most civilized countries during the last one hundred years it has been cut almost in two. Today there is a more widespread interest in the public health movement than ever before. There is a realization not only that large benefits have already been gained, but that still larger benefits will follow, because science has at last gotten a fair grasp upon the essential elements of the health problems, so that the sanitarian, instead of being obliged to base his efforts largely on faith, is now able to lead us through the still unknown territory, more rapidly and more safely than formerly, towards the goal so longingly desired.

Science is entering into more and more branches of activity. It has spread from physical activity to organic life, then into the realm of psychology and is now leaping into sociology, where it promises eventually to regulate and control our conduct towards each other by natural law.

Professor Swain says: "As long as there are masses of men who are shiftless, lazy, incompetent and vicious, whom nobody would willingly employ, poverty will exist." Poverty and ignorance are the two great causes of unsanitary conditions and both lead towards sickness and death.

Harris says: "The prevention of poverty is to be found in good sanitation enforced by the municipality, in suitable education of individuals according to capacity, and in self-help rather than in economical revolution."

Homer Folks, in his excellent discourse on "The State as a Life Saver," says: "Life is the supreme gift. Life saving is the highest and noblest of pursuits." "How far is our present knowledge of life saving applied? What are we, all of us, acting through government, doing and what further can we do to save life? These are among the biggest questions of the age."

The growing interest in sanitary science is reflected also by this association, whose members, selected from the best men our continent affords, have organized for progressive work. The speed with which progress is being effected in other civilized countries makes it necessary to accelerate our own work, increase our efficiency, and thereby multiply our results. To accomplish this requires a well defined program.

Let us look over the hygienic field and make a survey of what we are doing and of what we shall yet be obliged to do. For this purpose we can conveniently divide the field into four parts: Hygienic Data, Applied Hygiene, Hygienic Education and Hygienic Legislation.

I. HYGIENIC DATA.

Hygienic data are the fundamental elements upon which public health work is based. They relate to individuals and to the family. I shall group them as follows:

1. Vital statistics.
2. Infectious and communicable diseases, including infant mortality.
3. Disease carriers.
4. Eugenics.

1. In order to make our vital statistics most useful it is necessary to have methods or records which will give us the desired information in the best practicable manner. At the present time this result is not completely obtained. It is pretty generally recognized that reform is required, and it is also necessary to have the taking of statistics extended over the entire areas of our countries. At present the registration area in the United States covers hardly two thirds of the entire population. Unless our statistics are fairly complete and satisfactory, deductions from them will correspondingly lack in force and make further progress difficult.

Vital statistics, in Europe as well as here, are slowly being profitably extended to morbidity. It is valuable to record not only the fatal cases of disease, but also those which may not be fatal. The public health service should primarily endeavor to prevent and control diseases, whether the patient ultimately recovers or not. Whether during the recent public health movement morbidity has been reduced as much as mortality can only be surmised. We believe it has been reduced much more, but statistical facts are needed to prove this belief. While in the middle ages sickness was so common that the customary greetings in almost all nations, some of which have descended to this day, was an inquiry regarding one's personal health, we have reached a stage where in healthy families a case of sickness has become comparatively rare.

The records of vital statistics, if they are to indicate the public health status, are about as important as bookkeeping is to indicate the condition of a business. In both cases we must have a correct understanding of the figures. At present there is a wide-spread misunderstanding regarding public health figures. To illustrate, let me first quote one of our members, an officer in the Bureau of Statistics in Washington:

"There is probably no form of untruth which is as vicious as that of figures, because the public regards what it sees in statistical form as being mathematically correct, never stopping to think of the origin or rationality of the figures. Thus there has been a set of statistics regarding lunacy going the rounds which, while true so far as they go, tell only one portion of the truth. The resulting impression made by these figures is that the whole nation is lapsing into lunacy and that within thirty years a sane man will be a freak fit for a dime museum."

The explanation of this anomaly lies in the simple fact that the records of today are more complete and cover more cases than formerly.

We find in some districts that the death rate in large cities has decreased while the rural death rate has increased. We should not necessarily conclude from this fact that the rural life is becoming less healthful. Some of the increase of city population is due to immigrants from the country, being of middle age and in the best of health. In the country there is left behind both youth and old age, in both of which the mortality is greater than in middle age.

Let me illustrate another anomaly from my home town, Montclair, N. J., with a population of nearly 25,000. Its death rate in 1912 is recorded as having been 9.83 per 1,000. If every person lived to be 100 years old, then among a thousand inhabitants 10 would die every year. The death rate would, therefore, be called 10 per 1,000, and yet in Montclair the death rate is less, as though the average life of its inhabitants was over 100 years, a conclusion no more absurd than the one that healthfulness is indicated by a low death rate.

Let me explain this anomaly by an exaggerated statement. Suppose there is an immigration into a town of strong and healthy men and women sufficient in number to double the population within a year. The general death rate per 1,000 at the end of the year might, therefore, drop one half without any change whatever having occurred in the healthfulness of the locality or in the administration of the town.

Consider the reverse case, namely, that the most vigorous half of a community emigrates from the town, leaving the weaker half behind. As nearly all the deaths occur among the weaker half, the general death rate after a year would, therefore, have practically doubled without any change in the local conditions. In short, immigration and emigration very materially affect the figures now used to indicate the death rates.

There is still another misinterpretation of the annual death rates that has been going the rounds. As all persons must die, the death rate irrespective of age must be 100 per cent. If we reduce the rate in youth, which, during the last few decades, has been so successfully done in civilized lands, then it must surely be correspondingly increased in older age. If no persons should die under 40, then all would have to die over 40. In other words, the fewer deaths when young, the more deaths when old. Instead of being alarmed by this increase of the old age death rate we should be pleased. While modern sanitation, due to better public health service, has reduced the unnatural death rate of the young, it has increased the natural death rate of the old, and has thereby enabled a large percentage of persons to live a longer life and more closely approach the age limit when all persons must die. Some cities now group the deaths into decadal periods. This is a simple way of overcoming some of the anomalies above mentioned and the practice should be extended. However, until we can take account of immigration and emigration during the same decadal periods, we will still have death rate figures which do not indicate the general healthfulness of the people or of the locality. The elimination of misleading vital statistics and the adoption of uniform methods of recording would be very helpful in reaching more correct conclusions regarding sanitary improvements than is possible at present.

2. The second group of hygienic data in the discussion of public health comprises infectious diseases and infant mortality. Only a few words need now be added to what has already been said regarding the progress that has been made in the control of such diseases.

Research must be vigorously continued if we would discover the causes of all those infectious diseases which cannot yet be controlled. The public health service should carefully keep track of such progress, and at once employ the best means and ways to combat the spread of such diseases.

Tuberculosis is in most civilized countries the cause of the greatest number of deaths. The cause of tuberculosis is known, but the means of positively exterminating in our bodies the specific bacillus, so far as its fatal effect is concerned, is not yet known. But present knowledge indicates the direction, by palliative treatment, along which a cure or an arrest may be expected under certain conditions. This most prominent of all fatal diseases has, therefore, lost some of its former terror, and it is not improbable that we may expect to see also this blight upon our development conquered in the possibly near future.

Pneumonia, another frequently appearing enemy, may also be largely prevented, controlled and reduced, although the entire story and its satisfactory ending cannot yet be told.

Infant mortality is another most productive field for sanitary effort. Chapin believes that in Providence, chiefly by overcoming the ignorance of mothers, 200 babies have been saved in one year. Homer Folks says regarding the reduction of infant mortality, that "New York City has achieved in this respect one of the most notable triumphs in the history of public health."

3. The third group of hygienic data relates to disease carriers. Much could be said on this subject, but time allows only the remark that the public health service has no greater duty before it than to prevent disease germs from being carried from the sick to the well. We know today that infected water and milk, sputum and excrements from diseased bodies, raw shell-fish, rats, mosquitoes, flies and other insects, are the *real* dangers to public health. With this knowledge it has now become possible even to eliminate the causes of a number of diseases, so far as the conditions may permit.

Much more knowledge, however, is yet required to know the conditions under which pathogenic bacteria are slowly or rapidly developed and those under which they may be slowly or rapidly destroyed, in the above mentioned carriers, so that this knowledge can be applied most effectively and most economically in the public health service.

4. The last group of hygienic data is eugenics. In the previous groups we dealt with the individual as a factor in the public health service. In the present group we consider the other equally important factor for a social organism, namely, marriage, the procreation of offspring and the improvement of the race through improved conditions in the relation of the sexes.

No less important questions are here embodied than were mentioned in the previous group, because we should view the race questions with the same thoroughness as those which relate to ourselves as individuals. Public health service should concern itself also with the health of the family as the social unit. It should guide the public in controlling the conditions to improve the coming race physically, intellectually and morally.

We pay much attention to breeding stock, horses, cattle, dogs and cats, with the commercial object of improving them, but pay little attention to breeding the human race for the purpose of improving it. Marriage is still generally permitted among confirmed criminals, and paupers, and among physically as well as mentally diseased persons, which practice lets loose upon society a large number of degenerate and weak offsprings, not only for support by the public but to carry into the community intellectual and moral infection of all kinds. And this shocking condition is further aggravated by a higher birth rate recorded in the less desirable element of a community than in the better element, which caused Macauley to fear that the breeding of barbarians would some day destroy our civilization.

Is it not as foolish to permit this condition to continue, as to foster for no purpose a propagation of weeds, disease-carrying insects and dangerous animals? Is not this condition hygienically, socially and economically indefensible?

Effective and positive measures are required to increase among us the socially desirable traits. We are already endeavoring to suppress the means by which defective traits can be imported into our countries. We have also recently begun to adopt hygienic marriage laws in a few of our states, but barely a beginning has been made. In addition to the religious and legal phases of marriage, we need to establish also the scientific and medical phases.

The science of eugenics is gradually developing, and many people, who are thinking beyond the present and their physical surroundings, are falling in line with this new progressive movement, already fairly started both in

America and Europe. This association should, in my opinion, also take up this subject. A section composed of members most able to treat its various scientific and moral elements, preparatory to an appeal for suitable legislation, would render a service to the race, and keep the association abreast of another progressive movement of the day.

We have completed a cursory view of the principal hygienic data which relate to public health and constitute its foundation. This foundation, although sound, is as yet scant, and consists only of piers rather than of an extended base. But these piers are firm and fully justify us in proceeding to apply the data to our practical cases, and await the future to further elaborate the structure.

We can now take up the second part of the subject, namely, that of

II. Applied Hygiene.

This may for convenience be divided into six groups:

1. Social hygiene.
2. School hygiene.
3. Industrial hygiene.
4. Municipal hygiene.
5. Railroad and navigation hygiene.
6. Army and navy hygiene.

Let us again consider hurriedly a few facts regarding some of these groups.

1. *Social Hygiene.*

The application of hygienic conditions to the social organism is quite extended and, strictly speaking, perhaps includes all of the other groups to follow. It is, however, here limited to those parts of the organism which are not specifically treated in the other groups, and are: parks and play grounds, facilities for exercise and bathing, facilities for intellectual and mental improvement, hygienic effects of the social relation, hospitals and other public institutions, and organization of health departments.

Social hygiene, outside of schooling, should be devoted chiefly to giving to the people larger opportunities for recreation in every healthful way. This recreation should be extended to physical, intellectual and ethical subjects. In our largest cities we are getting more and more opportunities for these extensions, with excellent results. Interesting topics for mental recreation have the same beneficial hygienic effect as interesting ways of physical recreation. Both in Europe and America more and more attention is given to these subjects.

Social hygiene embraces also the effects of the fundamental relation between the people and the social conditions under which they are placed. The health problems arising herefrom are being clearly recognized and studied. Those in charge of the effects of such relationship should have a high intelligence and a large experience, in order to accomplish results that will be both permanent and satisfactory. But not only the well members of a community need suitable provisions to maintain their health, the sick and feeble must be given at least equal care. Hospitals, suitably planned and located and sufficient in capacity, must be provided whereever the hygiene of the social organism is to be kept at a high standard.

The whole subject as herein limited, in its physical and intellectual and moral aspects, is a fruitful field for further study and sound recommendations.

2. *School Hygiene.*

The interest prevailing at the present time in the subject of school hygiene is evidenced by the international congress just held at Buffalo. A glance at the subjects of the many papers read and discussed indicates its importance and the many phases of the subject which need further investigation, study and report.

School hygiene, besides its mental subjects, embraces the physical subjects of proper light, heat, ventilation of the buildings, of food and water, school books and charts suitable for young eyes, and disinfection of all materials previously used. It comprises suitably designed desks and chairs, and seats at such locations best serving the natural vision and hearing capacity of the pupil. Medical inspection has been had in some schools for many years. As yet there is no generally accepted practice, either regarding what is to be inspected or the methods to be employed. As from 6 to 10 years of our formative age is devoted to school life, and as many children are brought to school with physical defects, in perhaps one third of the cases, the importance of the subject has long been recognized. Yet in practice a large number of the schools still lack an efficient inspection. Medical school inspectors and instructors should become as necessary as the present teacher, if the body of a child is to be properly prepared both physically and mentally for the coming duties of life.

All instruction should be given, so far as practicable, in a form to arouse interest in the subject to be learned. The result is a clearer understanding, and the effect upon the mind will be along more natural lines, and, therefore, more hygienic than if the interest is lacking. It will be similar to the acquisition of physical accomplishments, which, if encouraged by interest, always reach higher development than without it.

It is stated that from 5 to 10 per cent. of all children are born feebleminded or mentally dull. For such unfortunates the communities should provide special schools so that they can receive adequate instruction according to their capacity, instead of entirely failing in the usual classes, where the larger percentage consists of more gifted children.

3. *Industrial Hygiene.*

Among the recently born factors in the public health movement is industrial hygiene. The closely crowded working man, the unhealthful materials used in some manufactures and the strain resulting from certain excessive nervous and muscular activities, all demand that such occupations be regulated by wise provisions, so as to prevent the creation of exhaustion or debility and of destruction of human life. About one half of the wage earners in the United States are engaged in the manufacturing trade and in transportation, and the high importance of the hygienic phases of their work as a public question, is, therefore, evident, and this new branch of hygiene is deserving of special attention. A movement seems to be already materializing to teach the subject in medical and technical schools under headings such as these: "Mechanical and Clerical Work and their Physiological Effects," "Treatment of Trade Diseases and Accidents," "Factory Fatigue and its Causes," etc.

Public health service applied to industrial hygiene becomes in a measure also an economical question. The financial value of good health is quite apparent to an industrial worker. Good health and a prolonged life means to him an economic gain. Western Europe leads us in preventive and protective measures for industrial labor. We in America need more investigation and study, of the somewhat different conditions prevailing in our country, before we can crystallize the best ways and means to protect our labor most efficiently, and finally to have rational and effective legislation.

4. *Municipal Hygiene.*

Municipal hygiene covers all those branches of a public health service which relate to a municipality, such as:

Air and water supplies.
Food supplies.
Illumination and acoustics.
Vehicles for city conveyance.
Street and river cleaning.
Disposal of the dead.
Sewage, rain water and refuse removal.

Time permits but a few brief remarks concerning some of these subjects, and I shall pick out those which are most in need of further investigation before they can satisfactorily fulfill public health requirements.

The first subject, that of supplying suitable *air* to enclosed spaces, of heating, ventilating and removing foul air, is one which as yet is not sufficiently well understood in detail, and on which there are still opposing opinions. In fact, of all the branches of sanitary engineering at the present time it needs most investigation and most study.

Water supplies are of great importance to public health on account of the possibility of their being carriers, chiefly of typhoid fever and diarrhœal diseases. The modern conclusion, which is being pretty generally accepted in the interests of public health, is, that all surface waters, except after long storage in fairly inaccessible places, shall be purified by filtration or other treatment, and that only ground or spring water, when palatable and not excessively charged with objectionable dissolved minerals, and when not receiving subsurface pollution, may be consumed in the natural raw state.

Great progress has been made in the economical disinfection of waters, by which, at least, the pathogenic bacteria can be destroyed at small expense in an otherwise clean water.

Food supplies also offer a field for more investigation and action, and is still one of the live questions before the people. It can be truly said that we are too often not served with the most healthful available food, nor do we receive it in the most economical way. The question is, therefore, both a sanitary and a commercial one, the combination of which being a main cause of the difficulties in securing satisfactory results.

The increasing cost of food, whether justly or not, will bring about a more careful study of food values to determine what quality of food is best suited for the different occupations of man, and to determine what quantities of each kind of food are necessary to produce the desired effect in each case. Research both in America and Europe in the field of metabolism is making progress towards this end. The transportation of food is another question that here and there needs more satisfactory answers; such as the best means of bringing food, especially milk, meat, eggs and fruit, from the source to the table. The transportation of fruit packed when in a ripe condition is still largely unsatisfactory. We must yet know more concerning the differences in the physiological effects between the consumption of fruit picked when ripe and the consumption of fruit picked when unripe and which is now too frequently sold in the markets. In the meantime refrigeration cars and ships are used to overcome some of the troubles. How much can be done in these matters, is indicated by the milk industry, particularly in the eastern part of the United States, where it has reached a height both in quality and safe distribution never reached before in any country.

The adulteration of foods should also come in for a word. The question is generally divided between the evils of poison and of fraud. It is rarely the former, and among the latter there are cases where the addition of a preservative may be harmless to health and a great advantage in transportation. The subject still needs a convincing presentation based upon unquestioned facts. The screening of foods against flies is making good progress in this country. The practice should be encouraged by educational means and by law. The application of hygienic laws to the conditions existing at markets and slaughter houses is better enforced as a rule in western Europe than here. We should endeavor to improve them and reach at least the same high plane.

The public health aspects of good *illumination* in closed spaces, and particularly in working rooms, are beginning to be appreciated and studied; also the effects of good *acoustics* in school rooms and lecture rooms. Both are well worthy of more attention than they have heretofore received.

Public health is also affected by means of public *conveyance* within a town. It may be that a person recovering from an infectious disease, though not beyond the point of transmitting infection, occupies a public conveyance and transmits the germs to his neighbor or to a person later occupying the same seat. Disease has been frequently communicated in this way. We are still deficient with our precautions in this matter. The frequent change of passengers in the street cars seems to make precautions extremely difficult. It is a question that, on account of this difficulty, deserves more attention than it has received.

Street cleaning concerns public health chiefly on account of the dust created by city activity, which settled upon the surfaces of the streets. This dust cannot all be removed by sweeping. A heavy rain washes it into sewers. Between such rains it is now found best to remove it by water flushing. Only a few cities in America have as yet a satisfactory system of street cleaning equal to that of western Europe.

River cleaning is another subject which is rising up to receive attention by the public health service. Rain water washes dirt and dust into the rivers and much of it deposits and remains at the bottom. When sewers discharge into rivers much of the heavier matter settles. Much of the deposited matter putrefies.

The opinion is gaining that rivers should be kept as clean as streets, our thoroughfares on land. For this reason it is urged to keep from entering our rivers all offensive material that can be excluded. It is, likewise, urged to regularly remove from river beds, in populated districts, such settlings and putrefactive matter, which it is not practicable to prevent from getting into them through the surface washing effects of rainfalls.

The *disposal* of the *dead* now and then revives discussions of preference as to the best ways and means of accomplishment, but without final conclusions. In civilized countries burial still prevails. In modern times cremation seems to be gaining many advocates. Desiccation of the body, once a promising modern sanitary innovation, having sentimental and legal advantages, has lately not been revived. From a public health standpoint there is little difference between the three customs, if each one is properly conducted.

Sewage disposal has of late received a material advance which now makes it practicable to collect, convey and dispose of a city's waste waters without necessarily causing any nuisance at any point. This advantage is obtained by producing, on the one hand a rapid flow without deposits, from the points of origin to the points of delivery, and on the other, a decomposition under several pounds of water pressure, and without putrefaction of the solids settled out from the sewage; and by producing an oxidation of the remaining liquids while percolating through certain porous materials.

While in this manner all nuisances can be prevented, public health service must still be watchful of the pathogenic bacteria which may pass through such works. These may now be destroyed in the effluent by disinfection.

In the disposal of sewage a distinction should be made between giving it simply a treatment or a purification. The latter generally requires expensive means and is often unnecessary, particularly when the effluent enters a stream which contains water that cannot be kept pure, and when some moderating treatment is sufficient.

The sanitary disposal of *solid city refuse*, since the American Public Health Association made its report some eight years ago, has not advanced materially, except by improved machinery and a better understanding of the details of the subject. Both Europe and America are agreed that different methods of disposal are practicable, according to the different local conditions. It is also agreed that the cost of collection is a controlling factor, and that, other things equal, the combined cost of collection and disposal should generally decide the preference between the several available methods.

The best of these methods, so far as the most objectionable parts of the refuse are concerned, may be stated to be:

First, a separate collection of garbage, its reduction to grease and fertilizer; and a separate collection of the rubbish and the incineration thereof.

Second, the combined collection of all refuse and its incineration, with the production of steam.

From a public health standpoint both methods are unobjectionable, if the collection of the garbage is prompt and proper, and the operation of the disposal works is careful and efficient.

5. *Railroad, Navigation, Army and Navy Hygiene.*

A few more groups of applied hygiene were mentioned as being the means of transportation over land and water, and the army and navy hygiene. Time does not allow us to enter upon these wide fields. They are being explored in some directions quite thoroughly and good advances have been made. But more remains to be done.

On railroads we have the chief question of car hygiene, the most healthful arrangements for day coaches and sleeping cars, their ventilation, heating and disinfection. The Pullman Company has already taken a number of precautions which apparently are satisfactory. On large steamships we have similar precautions.

The best class of cars and steamers are, as a rule, hygienically fairly satisfactory, but the average cars, steamers and sailing vessels, and particularly those below the average, in the attention given to cleanliness, are more or less in need of improved arrangements.

We have now reached the end of the subjects of applied hygiene. It is a large field, a very important field, and one which has as yet been but partly explored. It should, therefore, be the duty as well as the desire of the members, by committee or otherwise, to help in the exploration of the unknown parts and to find solutions for the unsolved problems.

We have, first, hurriedly considered the hygienic data required to furnish the foundation for the many subjects of applied hygiene. We have then briefly considered also these subjects themselves.

It remains now to briefly mention two more branches of the general topic of this address which indicate the means by which the public may reap the greatest benefit from the conclusions reached by the above mentioned scientific and practical health work.

One is bringing about a better education on health matters; the other is securing legislation which will enable the conclusions concerning public health service to be better carried into effect.

III. Hygienic Education.

Hygienic education is one of the mainsprings of the present movement to improve public health. When it becomes generally known and appreciated that the diseases which cause over one half of our deaths are and will be preventable, and when the people learn how such ailments can be prevented or cured, they will rise up and demand these benefits.

Let me quote from an address by the first president of the American Public Health Association, Dr. Stephen Smith, of New York, delivered at its first annual meeting forty years ago:

"The general facts of physiology and pathology should be taught in all our schools, from the infant class of the primary school to the senior class of the literary colleges. . . . These studies are not too abstruse for the young. . . . The child of 10 years can comprehend the acts of digestion and assimilation, the structure of the lungs and the method of respiration, the anatomy of the heart, etc. . . . Older pupils will comprehend the more involved pathological processes. . . . Were a well digested system of education in matters which so vitally concern the well-being of every person, adopted and put in practice, with anything like the vigour with which we insist upon the study of the common and useful branches, and the uncommon and ornamental branches, within one generation the whole mass of the people would be so enlightened on subjects relating to the hygiene of every day life that our average longevity would be immeasureably increased."

Education, as here suggested concerning our body, its structure, its physiology and hygiene, if begun in our lowest classes and convincingly effected by attractive illustrations in the most modern way, dynamic as well as static, by exhibition, by descriptive popular lectures and bulletins on the preservation of health and the prophylaxis of disease, will do more to improve public health than almost any other single means yet attempted.

No more convincing occasion to prove the general interest of the public in matters of public health could have been found than the Exhibition of Hygiene in Dresden in 1911. The principal building was intentionally educational. If we judge by the attendance, which during parts of the day had to be limited to admission by relays on account of the crowds of plain people desiring entrance, no exhibition ever achieved a greater success.

By thus popularizing practical scientific knowledge we will effectually cast upon the desert the many fakes which still have a hold upon so many of our people.

A campaign of hygienic education seems to be one of the most important of all duties in the effort to improve public health. A section created for the purpose of first developing the most rational plan of procedure, and then the best means of carrying it out, should be of great benefit. Our JOURNAL, of which I shall presently say a word, can be an admirable means to forcibly assist in this cause.

IV. HYGIENIC LEGISLATION.

In the first report of the American Public Health Association in 1873, its secretary, Dr. Elisha Harris, said: "Sanitary officers of health have to perform their duties under laws which in most states are not worthy of an enlightened people. A sanitary system worthy of the present state of the physical sciences and of hygiene, hardly has existence in any of our states."

Since then, the laws in a number of states have been improved, although some are still crude and unjust, and are either ineffective or accomplish the reverse of what is desired. No laws should be passed until they have been approved by scientific, practical and executive public health men, by such that have had the necessary experience in the special fields to be covered. Too often laws are based on old precedents, ignoring the facts of recent progress. Laws may have been just and proper a generation ago in Europe but at present they may be wholly unjust and improper under the new conditions now facing us on the North American Continent.

Enthusiasts in the public press often talk about health measures as though their purpose could be fulfilled simply by passing any kind of a law. Such laymen forget, first, the large amount of positive knowledge and training that is a prerequisite to efficiently carry out a definite and just procedure that will affect an entire community, and, secondly, the amount of money required to carry out the measures which they believe will solve all difficulties.

Laws should not be enacted without having their substance, their flesh and blood, suggested and approved by the best available specialists, leaving it to the legal profession to suggest and fix their framework and the external protection against illegality, so that the new law while allowing the fullest freedom of action along all lines of possible progress, will be competent to secure justice to all interests concerned, will be efficient to carry out the intent, and prevent an ingress of disturbing elements which might become antagonistic to its purpose.

In order to put any conclusions that may be reached by the American Public Health Association into practical use, we need, it seems to me, also a committee on legislation, to take the necessary steps to suggest and urge the passage of laws which embody those conclusions.

We need above all at the present time, the legal extension of the registration of vital statistics throughout the country. We need better laws in many states regarding the control of infectious diseases, infant mortality, disease carriers and eugenics, and, in fact, also through the entire list of applied hygiene.

V. The Journal.

During the past year our Journal has improved favorably under the conscientious supervision of the Committee on Publication and the able editorial staff. Its contents consisted largely of the papers read at the last annual meeting in Washington, but a number of new articles on live topics were added. A new feature, and one which it seems to me is specially valuable, and should cause the issues to be awaited with eagerness and read with satisfaction, is the division modestly placed at the end, called "Health Department Reports and Notes." No other monthly publication gives, as news matter, a better account, more carefully selected and edited, of the more important public health matters in America. It is hoped that this division and others can be still further developed, enlarged and extended. The external appearance of the Journal is creditable to the association and to those who are directly responsible for it.

If this association vigorously pursues the campaign of education in a popular and effective manner, and endeavors to spread the most essential and convincing facts among our people, our Journal would, it seems to me, be one of the best assistants through which to accomplish it.

VI. Conclusion.

To draw a few general conclusions from the foregoing presentation, let us recall how, from a small beginning among the ancients, the public health movement has grown, first slowly, then rapidly, and has now reached large dimensions; how this growth has proceeded *pari passu* with the growth of pure science in general, and of medical science in particular; and how closely the public health service is allied to applied science, with which it is constantly advancing and through which it receives its practical realization.

The interest in this health movement is also spreading broadly, not only among the more educated but among the plain people, as soon as they are given the opportunity of learning plain facts about the preservation of their own health and of the health of their families.

With the greater expansion of the public health service came greater ramifications and complications, resulting in the demand for still larger and more complex health departments. The intimate relationship between city and country and between cities themselves, soon required state or provincial boards of health. Soon after this step the expanding relationship between the states themselves and between the home country and foreign countries finally required national health authorities.

In 1808 Prussia established a Royal Board of Health, as a bureau under the Secretary of the Interior. In 1876 Germany founded its Imperial Board of Health, consisting of physicians, engineers and lawyers, acting chiefly in an advisory capacity, and subdelegated to the Department of the Interior.

France, since the middle of the last century, has had a Consulting Committee on Public Health, made up of physicians and engineers, and subdelegated to the Secretary of the Interior. It has lately been proposed to create a department of public hygiene, its president to have a seat in the Cabinet.

England had a general board of health established in 1848. In 1871 it was embodied in the new Local Government Board, an administrative department of the United Kingdom, the president being a member of the Cabinet.

Canada has lately been agitating the question of organizing a national Department of Public Health, the presiding officer to be a member of the Cabinet.

The United States has a Public Health and Marine Hospital Service, delegated to the Treasury Department. It has done the pioneer work of the public health service in the United States, has an excellent force, is expanding and will no doubt remain the nucleus of every further development towards an independent administrative department.

Mexico has a very efficient Superior Board of Health, with powers extending over the entire country, for which it has done excellent service in public health protection.

Cuba is the only country in our association which already has a national Department of Public Health and a Minister of Public Health with a seat in the Cabinet.

When we contemplate the evolution of the public health service in the older countries, it seems clearly in the line of natural development that the administration of the public health affairs of a country should be delegated to an independent administrative department, presided over by a Cabinet officer. It does not seem difficult to foresee that it can only be a question of time when such a national department of public hygiene will be established in the government of every civilized land.

No service could have more justification for its existence than one which establishes the means for improving the physical and mental health of the people.

No service could be more important to the industrial and political life of a country than that which maintains good health by which the human creative and producing forces of a country can best develop.

No service could more efficiently control the factors operating over an entire country, which affect the health of its inhabitants, than that of a public health department.

As will appear from what has been said, the work which this association has before it, is extensive and complex. In order to accomplish results not only much time and work are required, but this time and work must be efficient.

In large associations efficiency is obtained only by subdivision into committees and sections. The International Medical Congress which lately met in London has a wide range of medical subjects, but no wider than that of public health. It has thirty-two sections and subsections, while we have far less.

To accomplish the work which seems to lie in the path of destiny for this association to do, it appears that the number of sections and committees should be materially increased. This narrows the field for each one and permits the applied forces to be more effective. An increase of committees, besides helping to intensify the work, would also accelerate it, and correspondingly multiply the results.

The fact that other associations are taking up more or less intensely some of the special phases of public health is no reason why they should here be excluded. The name of this association embraces all phases of public health. Its main purpose is to establish harmony among the many subjects. Each one should be considered as a part of the whole and elaborated only so far as its relation to the whole demands. It should be a clearing house. But the function of a clearing house in the public health field brings with it the further necessity of establishing a permanent headquarters, adequately manned, for the conduct of the association's business, which must continually grow, if it is to fulfill its duties. I trust the association will give such a proposition due consideration, as well as the allied one of providing adequate financial support.

The chief factors which accomplish results in committee work are a systematic procedure and persistent devotion to the cause. The motive power producing this devotion must be the conviction that valuable results can be accomplished, and that both research and faithful coördination of all known facts will furnish the data, the inductions from which will solve the problems of applied hygiene.

No association can have a higher aim than ours, because it endeavors to point out the ways and means to save lives, to provide better sanitation and to furnish greater comforts of living.

And no association can give to its members a stronger personal incentive for effective work, if we realize that "life saving is the highest and noblest of pursuits," and that "good health is our greatest gift on earth."

LIMITATIONS OF THE FEDERAL FOOD LAW.

Dr. Carl L. Alsberg,
Chief Chemist, U. S. Department of Agriculture.

Read before the General Sessions, American Public Health Association, Colorado Springs, September 9, 1913.

The forty-eight states must rigidly inspect and control all easily contaminated foods and drugs produced within their borders. These include such foods as milk and other dairy products, water, fish, shell-fish, many meat products, candy, and, indeed, all food that is eaten raw or shipped exposed to the air. Each state owes this protection both to its own citizens and to those of other states who buy its products.

The individual state must guard the health of the state. The Federal authorities cannot do this work for the states. The Federal authority, under the Food and Drugs Act, extends only to food products entering into interstate commerce, and transmission of disease through infected food and water is not wholly an interstate matter. Disease frequently is of local source and local spread. The Food and Drugs Act is not an effective weapon against the spread within the state borders of disease-producing organisms in food. The federal authorities cannot interfere with domestic commerce, but the state health officers are under no such limitations. Moreover, the Federal authorities have no right of entry and inspection into food factories within the state lines. A factory can be run under the most unsanitary conditions; milking may be done by a man recovering from scarlet fever, or milk may be produced on a farm where a member of the family is suffering from typhoid, and the Federal authorities have no power to act. Even if these products are shipped across the state line and samples are taken, there is no method for analyzing a product which can supply evidence that the food is produced in unsanitary ways or within contaminating reach of epidemic or endemic diseases. The state authorities, however, can enter these factories, need not wait for shipment across state lines, and, therefore, provided only that their laws are efficient and the funds at their disposal adequate, can prevent the sale of these deadly unlabeled foods.

The Food and Drugs Act, as administered in the past, has been very largely an economic measure. It has, to be sure, prevented very largely the mixing of active poisons in hurtful quantities with food products, but its particular work has been to see that food products are properly branded, so that the consumer knows what he is getting and is not cheated into paying a high price for a product adulterated with a cheapener. This must of course always be one of the purposes of the Act; but we must not be deceived into believing that this very important economic function of the Act is of great hygienic significance. Misbranding does not demonstrably affect the death rate of the country. If the efforts devoted to prevention of misbranding were to be concentrated more largely upon the suppression of the traffic in contaminated milk, meat, vegetables and other products that may carry disease, a positive reduction of the country's death rate would inevitably result. At best, however, the Federal authorities under the Food and Drugs Act can deal only with such of these bacteria-carrying products as chance to enter interstate commerce.

The Federal control of interstate commerce has been in the past, and will have to be in the future, of more benefit to the large cities than to the small towns and rural communities, because the large cities even though in the center of the state draw their supplies to a far greater degree through interstate commerce than do the small towns and rural communities. The help that the Federal inspectors can extend to the rural communities, therefore, is absolutely limited to those settlements which happen to be near the borders of the state and so receive some of their easily contaminated foods through interstate commerce. The rural communities in the hearts of the states seldom obtain these unlabeled and possibly dangerous foods through interstate shipment. They get their food of this kind almost wholly in domestic commerce. Their milk comes from nearby farms. Their meats, if not slaughtered locally, come from nearby cities. Their fish and shell-fish may be shipped to them from sea-food centers in the nearest large towns within their state borders.

It is unfortunate that the large cities derive such preponderating advantages from the Federal control of interstate commerce. I say unfortunately advisedly, because the large cities need Federal protection far less than the small town or rural community. The reason is that systematic health protection work in the United States is largely confined to the big cities.

In many states the large cities are the only points which have any real sanitary protection. Our rural population of 49,000,000 people, including the 30,000,000 who live on farms, with the exception of those fortunate rural dwellers in one or two exceptional states which regard the health of the country people as also important, receive very little state health protection and maintain no local protective system of their own against contaminated local milk, meat, shell-fish, fish or vegetables. Moreover, only a small number of these rural inhabitants are safeguarded, by competent inspection, against polluted water supply or sewage disposal methods dangerous to health and life.

To this rural and unprotected population we can add the bulk of the 14,000,000 people who live in towns, cities and suburbs of less than 25,000 inhabitants, excepting those here and there who happen to dwell in the more progressive towns, or in those few hamlets located in the exceptional states that have already awakened to the importance of rural sanitation. If we wished we could go even further and add the populations of many cities of 25,000 or 50,000 people which maintain no health officers; and of those cities which have health officers but so cripple them with poor laws or ordinances, or with insufficient funds, as to make their food inspection work most ineffective. I mean cities, for example, where boards of health are practically powerless under the law to seize milk except when it is actually watered or skimmed. These health officers must look on helplessly while milkmen send milk so dirty, or from such dangerous, disease-breeding places, as to make it a menace to the consumer. To prevent this deplorable condition it is absolutely necessary that uniform standards of bacteriological cleanliness as well as chemical composition be established. Bacteriological control is absolutely necessary to prevent the spread of contagion.

The probability, therefore, is that there are upward of 70,000,000 out of our 91,000,000 people who have no efficient and systematic protection from the major causes of the spread of typhoid, tuberculosis, deadly intestinal diseases of infants, scarlet fever, septic sore throat, trichinosis, and other ailments resulting from the circulation of disease producing organisms.

We must not let ourselves be blinded by statistics, for the statistics of disease in the United States are notoriously unreliable. For certain sections no attempt whatever is made to collect them. I need not tell an audience such as this that reliable statistics are the basis of all health protection. Until severe penalties are inflicted for failure to report cases of infectious diseases, until failure to do so results in the cancellation of the license to practise medicine, there will be no really reliable statistics. And this will only be brought about when the state health services throughout the land furnish a permanent career for life instead of being, as they are but too often at present, a side-line of politics—medical or otherwise. And these services should furnish a career like the Federal Civil Service, to sanitary engineers and chemists as well as to physicians. The people must learn that their health is too valuable to entrust to temporary health officers or to physicians who devote to the discharge of their duties as health officers, only such irregular moments as can be spared from their private practices.

The sections of the country in which, as already stated, little or no attention is paid to keeping records of diseases are rural. The large cities keep some sort of record because attention to health protection and to easily contaminated foods is centralized almost wholly in the cities. With rare exceptions the effectiveness of the protective work depends on the individual city, rather than on a state-wide law or a state-wide and efficient health inspection system. Therefore, the collective figures of urban deaths look more significant, but if we could make an accurate total of the deaths on farms for the same causes, the figures would be appalling. In the country a man dies of "fever" or a "cough." The cities would announce that he died of "typhoid" or "tuberculosis." In the country babies fed on bad milk just die. In the city they die of accurately defined intestinal disorders and, when the infantile death rate mounts, rigid milk inspection follows. In the cities, typhoid is often traced to its source and protective measures invoked. In the country the dangerous well or infected food supply usually continues to work havoc.

One might suppose that where a city adopts and enforces a good health protection system, the educative effect of this must necessarily extend to the adjacent rural and suburban population. The truth is that an effective city health protective plan, where the surrounding rural districts have no adequate state or local protection, makes food conditions worse instead of better in the surrounding country districts. For example, Pittsburgh, Pa., and Cleveland, Ohio, have effective milk inspection. The health officer of one city notifies the health officer of the other city when milk entry has been refused to a certain dairy. This prevents that dairy from offering its refused milk to the other city. The results naturally would be that the producers of bad milk refused sale in these two larger cities could readily dispose of their product in the smaller places like McKees Rocks, Sewickley, Beaver Falls, and Coraopolis, which might have no effective milk inspection systems. The same thing is happening in many New Jersey towns. Milk refused entry into New York City by the board of health is sent to towns like Perth Amboy, which may have health officers, but which do not provide them with funds enough for efficient milk inspection work and to carry on expensive prosecutions.

The Department of Agriculture feels that it should give more attention to the protection of these rural communities. This means that the work hitherto largely confined to detection of the presence of preservatives in labeled foods which do not carry organic diseases, and the prosecutions for misbranding which might work a monetary fraud on the consumer should be widely and rapidly extended to the control of interstate commerce in the dangerous unlabeled foods which can transmit and which do transmit serious diseases.

Plans for extending this work to interstate shipments of milk all over the country have already been made. It is the plan of the department to do more than exercise merely police control over interstate shipments. Plans have been made at the same time to show the milk producer how to produce better milk; and also to show him that it will pay him to produce his milk under the best conditions. The educational and the regulatory work will go on together—an ancient combination much used by the old-fashioned school teacher who taught by precept when he could and resorted to the switch when he had to.

The only help that the department's work in the rural communities around the state's edges can be to the country districts in the heart of the state is to educate, through example and by means of publicity, the rural population throughout all the states to demand of the state that it extend to them the same protection now enjoyed by the large cities against preventable disease disseminated through their food. It is along these lines that the state officials can coöperate with the Federal government. They can help to arouse the public to demand effective state-wide measures in all the states, and to insist on an efficient, permanent staff of health officials, and rigorous supervision of the preparation of all foods liable to contamination and pollution. The Department of Agriculture will do its duty not merely in exercising control over interstate commerce, but also in helping food producers bring their food up to proper quality, and it will thus add materially to the available supply of honest and safe food in the country. The great purpose of the Department of Agriculture is a constructive one, namely, not merely to punish adulterators of food, but to help honest manufacturers to discharge their duty to the community by supplying wholesome products. The actual detection and closing of dirty or unsanitary factories and dairies, or the compelling of their owners to mend their methods, must, however, rest with the states.

THE FUNCTION OF STATE AUTHORITIES IN THE CONTROL AND IMPROVEMENT OF FOOD SUPPLIES.

H. E. Barnard,
State Food Commissioner, Indianapolis, Ind.

Read before the General Sessions, American Public Health Association, Colorado Springs, September 9, 1913.

Pure food control began with the efforts of city officials to regulate foods sold on local markets. For years this regulation extended no further than an attempt to prevent the sale of adulterated milk. Some thirty-five years ago the first state legislation was enacted and Massachusetts inaugurated a sytem of food control which since has been copied by most of the states. The states that began pure food work prior to the passage of the Federal Pure Food Law found their efforts were largely futile because of the very great difficulty with which the character of foods manufactured outside of the state and shipped in interstate commerce could be controlled after they reached the point of distribution.

The passage of the Federal Food Law and of the Meat Inspection Act, provided means by which the quality and labeling of foods shipped in interstate trade might be regulated and it is to the credit of the Federal departments that these laws have been so adequately enforced. At the present time the officials working in the several states need give little heed to the character of goods produced in other states, for it is only occasionally that anything crosses the state line without first having been subjected to the inspection of the Federal official. But the work of state authorities, while to this extent diminished, is none the less necessary. Such important food problems as the milk supply, meats slaughtered by local butchers, bakery products, beverages and the thousand foods prepared and sold in a local way must be handled by state and municipal authorities. Certain of these problems are better regulated by the cities than by authority centered at state capitals. Others so intimately concern the welfare of the whole state that their control should be a function of the state health officials.

There may come a time when towns and cities are officered by trained, competent sanitarians who can care for all local food problems, but until that Utopian condition arrives the state, with its better organized health forces, better laboratories and non-political personnel must assume control and provide for the safeguarding of the food supply after it has passed from Federal jurisdiction or as it originates and is distributed wholly within state limits.

A satisfactory meat inspection can never be attained unless the state assumes the responsibility for stamping out bovine tuberculosis and hog cholera. Prepared foods will never be surely clean until the state requires sanitary conditions at canning factories and manufactories. The state must compel all employees to bear certificates of freedom from disease and employers must insist upon such certificates as a prerequisite to employment. Proper handling of food in transportation within the state can only obtain under state legislation.

The functions of state officials must conform to the laws which define their duties. Therefore the first essential to satisfactory state work is adequate legislation. At the present time most of the states have more or less satisfactory pure food and sanitary food laws on the statute books, but even in states where legislation has been adequate the means for the enforcement of the laws have as yet not been provided or are so meager that the work cannot proceed with even moderate results. Health officers will naturally, and I believe properly, contend that the enforcement of pure food and sanitary food laws should be made a function of the department of public health. In many states, however, where the development of the dairy industry antedated any attempt to decrease death rates or improve sanitary conditions, pure food work was annexed to dairy work and up to the present time pure food and sanitary laws are enforced by commissioners of agriculture, dairy commissioners and other officials whose duties only incidentally bring them in touch with pure food work as it is at present understood. Such officials may well regulate the sale of oleomargarine, they may be able to improve the quality of the milk supply, but they are hardly in touch with the sanitary problems of a pure water supply, meat inspection service and the sanitary operation of cold storage plants, canning factories, bakeshops and groceries.

When the health officers of the state are given control of sanitary and pure food laws they bring to their work an experience in the administration of public health measures. They are primarily interested in the character of the milk supply not because they wish to build up a dairy industry but because they know that pure milk means decreased infant mortality. They are interested in sanitary slaughterhouses not that the butcher may have a profitable business or that the production of beef and pork may be increased, but because they know that the sale of diseased meat and meat prepared and handled under unsanitary conditions is a menace to the health of the community. They know that pure water means freedom from typhoid; that the baker suffering from tuberculosis is gaining a livelihood under conditions which menace his patrons; that venereal diseases, so commonly rampant among lower grades of employees, must be stamped out if consumers are to be assured clean food.

State authorities can work in fields where the local official cannot hope to enter. There is now developing throughout the country the reasonable belief that the men intrusted with the health of the state should be trained in the service and immune from the disasters which usually follow the overthrow of one political machine and the success of another. Permanence in position gives the state official an opportunity to develop methods of work and secure results which are not possible in local communities where city officials, no matter how willing, no matter how well trained, are too frequently handicapped in their efforts by reason of the fact that their friends, supporters and neighbors are frequently out of harmony with the ordinances they are called upon to enforce. Such conditions do not confront the official whose office is at the capitol, for if he be large enough his work proceeds without knowledge of politics, of friendships or of local conditions which make for law violation.

To state authorities must be left the development of a state meat inspection service. Some cities can take up the work where the Federal inspectors leave it off and provide a satisfactory inspection, but the smaller cities and the country towns where the local butchers flourish cannot conduct an adequate inspection. That can only be done by the state, and it is the duty of the state to provide it.

While the Federal laws are being interpreted along such broad lines that the sanitary supervision of food factories will shortly be as important a phase of the work as the inspection of goods landed at our ports, the state officials must assume the responsibility for the cleanliness of all distributing agencies, the bakeshop, grocery store, confectionery, restaurant, butchershop and ice cream parlor. All the little industries catering to a limited district must work under the supervision of state authorities and it is in just such places that the inspectors from state departments may find their greatest service. Healthy workmen, free from tuberculosis, venereal diseases and typhoid fever, can never be assured consumers until the state health officials require a certificate of health as essential to employment in food factories and distributing agencies. Perhaps the greatest function of the health official in the regulation and control of food industries lies in a better supervision of the health condition of employees. Heretofore health authorities have given much attention to benefiting the health of the workman. They have investigated the conditions under which he works, they have provided him fresh air and plentiful light, they have removed dangerous fumes from the workroom, they have protected exposed machinery, but they have not inspected the workman and except in isolated cases they have been content to allow him his place at the bench or machine if he could do a man's work, making no inquiry into his moral life or condition of health. The future will see developed a large view of the functions of health officials that will result in such medical inspection that the consumer may know that his food supply is not only properly labeled, free from adulteration, produced in a cleanly workshop from sound, raw material under sanitary conditions, but that it was produced, handled and distributed by workers whose touch was free from contagion and disassociated from the taint of disease.

Further, state authorities are leaders in educational crusades. The Federal government up to the present has been chiefly interested in law enforcement, and local officials are sworn to see that city and town ordinances are obeyed. The state official must assume the dual responsibility not only of enforcing law but of bringing before the people, consumers and producers alike, the basic reasons that made legislation necessary and to point out, clearly and carefully, the economic principles that demand good food. The food official is no longer a police officer; he has assumed larger, more important duties; he is now a teacher, and his best work will be done outside the courtroom and the laboratory and among the common people who are so largely concerned both in the production and consumption of the food supply.

THE FUNCTION OF MUNICIPAL AUTHORITIES IN THE CONTROL AND IMPROVEMENT OF FOOD SUPPLIES.

ERNST J. LEDERLE, PH. D.,
Commissioner of Health, New York City.

Read before the General Sessions of the American Public Health Association, Colorado Springs, September 9, 1913.

The broad principles involved in the official supervision of the general food supply of our country are, I take it, essentially the same in all states. As in New York City, governmental supervision is exercised through Federal, state and local authorities, although the relative importance of the three kinds of jurisdiction may vary in different cities. Federal supervision under the Federal Pure Food Law affects such foods as have come to the city through interstate commerce or importation from abroad. State supervision either through the State Board of Health or the State Department of Agriculture, usually the latter, assumes responsibility for the foods sold in the state. In practice the division of the work between local and state authorities in large cities depends upon the extent to which the state department will exercise its function in a municipality which has its own machinery for food inspection and control. In New York City, for instance, the inspection and control of food locally produced and sold is almost entirely in the hands of the Department of Health of the City of New York, which has a well organized bureau of food and milk inspection, and the state departments are left free to spend the greater part of their energies outside the metropolis. In this connection let me point out that it has always been the policy of the department never to undertake duties and functions that are already being satisfactorily cared for by other agencies, public or private.

If the Federal authorities had the necessary staff and equipment to strictly enforce the provisions of the Federal Pure Food Law, municipal authorities could devote all their energies to the supervision of such foods as are produced or manufactured within the state or within the city itself. It is well known that cities, unless they have adequate laws and regulations and the proper machinery for their enforcement, become the dumping grounds for adulterated foods.

LEADERSHIP OF FEDERAL AUTHORITIES.

The aroused nation-wide public sentiment which led to the enactment of the Federal Pure Food Law resulted in enormous benefit to the public.

This would have been even greater had not some regulations and standards thereunder been promulgated which were manifestly unjust. This has wrought needless injury as well as detriment to the whole pure food movement, because reputable manufacturers have been forced to ally themselves with others less scrupulous and to use all means within their power to oppose officials even in such part of their work as was good.

For the good of the cause throughout the land, there is a pressing need for continuous and practical coöperation between all official agencies, Federal, state and municipal, and this coöperation should have for its first object the adoption of uniform food laws, definitions, rules and regulations, and, as far as possible, uniform methods of enforcement. Food laws, rules and regulations should be as strict and exacting as the importance of the matter demands but they must be just and equitable, legal and enforceable. We rightly look to the Federal authorities as the pioneers in such a movement.

Need of Clear and Uniform Food Laws.

When the Federal authorities have rendered final decisions on important questions, such as the declaration that certain preservatives are harmful and, therefore, forbidden in foods, that substances like saccharin are harmful and fraudulent when used in foods, that copper salts are injurious when used for greening vegetables, violations should, after the lapse of a reasonable time, be relentlessly followed by prosecutions, and decisions obtained in the highest courts, so that they may be used as precedents by state and municipal authorities. Unless the law is thus clarified by judicial approval of administrative decisions, and made uniform in all jurisdictions, uncertainty, confusion and injustice result. For instance, in the case of saccharin, a Federal Food Inspection Decision (No. 138), issued in 1911 to take effect January 1, 1912, declared this substance harmful when used in foods, but as far as we can learn, no federal prosecutions have yet been brought, although saccharin is being used in increasingly large amounts throughout the country. The New York City Department of Health, following Federal leadership, has declared foods containing saccharin to be adulterated and has already brought sixty-seven suits for violations of the Sanitary Code. Fifteen cases have already been tried and convictions obtained. Sentence was suspended in most instances although fines were imposed in two cases. Fifty-two cases brought by the department are now pending in the various courts. There is thus a prospect of having this question settled within our own jurisdiction. We hold, however, that this matter should long ago have been brought to a final issue by the Federal authorities in the highest courts.

Another illustration is the matter of greened vegetables. The Federal authorities agreed, in food decision No. 148, that after January 1, 1913, no vegetables greened with copper sulphate could be imported, and that after May 1, 1913, these goods could not be sent into interstate commerce. Everyone familiar with the subject knows that on May 1, very large quantities of such vegetables were on hand in some of the large cities and that there has been no restriction in interstate traffic therein. Since we try to make it a rule to reënact Federal regulations in the local jurisdiction, we set June 1, 1913, as the date after which the sale of such goods in New York would be prohibited. Already thirty-one prosecutions have been commenced and here again we have the prospect of a long drawn out test case.

We believe that food consumers of the city have the right to demand that they be protected from foods that are not fit to enter interstate commerce. We believe in the need of adequately organized and equipped municipal bureaus of food inspection and we urge the need of thorough-going coöperation with state and Federal authorities. Let us next consider whether we always exhibit a due sense of proportion in questions of municipal food control.

RELATIVE IMPORTANCE OF VARIOUS PHASES OF THE WORK.

In view of the fact that the enforcement of pure food laws and regulations in cities usually falls to the health authorities, and probably rightly so, a serious misapprehension or misunderstanding arises in the minds of the public as to the relative importance of the various phases of this work and the importance of the work as a whole compared with other public health problems. The need of bringing this matter properly before the public by reliable and disinterested agencies cannot, in our opinion, be overestimated. Under the present chaotic conditions, reputable food manufacturers are at the mercy of unscrupulous writers who do not hesitate to entirely misrepresent the facts by sensational articles, sometimes to increase the circulation and to enrich the advertising columns of their publications, with the evil result of creating in the minds of the readers unrest and entirely false impressions on the whole food question.

In this misplacing of emphasis the popular literature of the day leaves the public in relative ignorance of a number of important public health needs. Not sufficient effort is made, for instance, to emphasize the surpassing importance of a clean milk supply which has such a direct influence on the mortality from typhoid fever, tuberculosis, scarlet fever and infant diseases. How relatively unimportant, as compared with the milk question, is the fact that a minute amount of coal-tar color is being used in candy or soda water or jellies, or that a jar of pickles contains an undeclared preservative, or that a small amount of gelatin has been used in ice cream! Alongside of the control of infectious diseases, the medical and physical examination of school children and other vital activities of a modern health department, it is relatively of small significance to the health of the general public that preserves are not true to the name on the label or that glucose has been used therein in place of sugar. To the practical minded citizen with an intelligent interest in public health affairs, it would seem pertinent to inquire how much of his limited appropriations a health commissioner should devote to this kind of food crusades in the absence of adequate facilities to keep the city properly vaccinated, to insure the purity of the public water supply, or, to isolate those sick with infectious diseases. And after all, what city does furnish adequate means to support all these necessary public health activities?

I earnestly hope that I may not be misunderstood. It may be said that this comparison of the relative importance of popular food propagandas with other functions of public health work is crude and exaggerated. In the quarters where sensational food stories are most welcome, I shall be charged with a very lukewarm support of the pure food movement. But it is precisely in those quarters that we first look for injustice, and I am sure that I do not need to say here that, in pointing out what I believe to be the gross exaggeration which has been placed on the importance of food work in the public health movement, I am nevertheless in absolute sympathy with the closest possible supervision of foods. Even though other problems are of greater importance, it is nevertheless the duty of the government to maintain the purity of our food supply and to prevent both dangerous adulterations and commercial frauds. Foods should be sound, wholesome, unadulterated, prepared with care under proper sanitary conditions and properly labeled. The most contemptible of all law breakers is the adulterator of foods.

COMMERCIAL FRAUDS AND PUBLIC HEALTH.

I am tempted to dwell for a moment on the distinction which has just been suggested, between dangerous adulterations and commercial frauds. Herein, it has always seemed to me, is to be found the secret of much of the misunderstanding and criticism in connection with the administration of food laws, particularly by health officials. Logically, the problem of preventing the deception of the customer by the substitution of harmless but cheaper food ingredients, or the use of unlabeled preservatives, should be clearly distinguished from the protection of the customer's health by preventing substitutions or adulterations which are really dangerous. In the actual carrying out of our system of administration of food laws, the entire work of food inspection, including both these phases of the problem, is frequently placed upon the municipal health department. The result is that the health department is called upon to perform functions which, strictly speaking, are outside its true field. Nevertheless, public sentiment is so thoroughly aroused on the subject of food adulteration that once the duty has been placed upon the health officer the community will tolerate no evasion of the responsibility and looks to the health authorities for protection, not only from physical injury but from dishonesty as well. Not without facing the certainty of severe criticism, can public health authorities relax the inspection and control of certain kinds of food adulterations which they perfectly well realize involve little or no danger to the public health. Of course, such commercial frauds should be followed up and prevented by the government, but it sometimes seems regrettable that, with so many true public health problems to solve, the sanitary authorities should not be relieved of this burden and other agencies created for the purpose. In Berlin, and doubtless on the continent generally, this work of punishing commercial frauds is entrusted to the police department and is clearly distinguished from the true functions of the department of health. Nevertheless, the American practice seems to be well established and a change should be made only after such consideration as would ensure that any other agency charged with the suppression of commercial frauds would act with full authority and proper efficiency.

Need of Prompt Settlement of Food Questions.

Returning to the point which I wish to emphasize, I believe we should have some means of testing all disputed food questions, both scientifically and legally, as expeditiously as possible. This is mere justice to the consumer and manufacturer. It is not an imaginary case that a food manufacturer, who, in good faith, has sold an article for years, should find it suddenly proclaimed by an over zealous official as dangerously adulterated. When, after years of litigation at an enormous expense and after his business had been ruined, the manufacturer receives a favorable decision from the highest court, is it to be wondered at that he has little respect left for food laws and officials? Is there not something radically wrong in what we are trying to do, or with the way we are going about it, or with those who have the power to do such an injustice? In furtherance of the real pure food cause, cannot something be done to remove the temptation to officials to play to the galleries and to take advantage of false public impressions created by unscrupulous agitation? Cannot food officials be induced to abandon such misdirected and pernicious activity and to devote their energies to leading public opinion in the right direction?

The following are a few of the many problems confronting food officials, which, in the interests of justice, should be at once settled by scientific determinations and court decisions:

1. The significance of bacteria in foods.
2. The status of sulphur dioxide in foods.
3. The use of coloring matter in foods.
4. A practical method of control of the whole egg industry and to what extent this should be carried out, considering that according to our present knowledge on the subject it is of small significance from the public health standpoint.
5. The regulation of the so-called "bob veal" industry.

MUNICIPAL CONTROL OF FOODS IN NEW YORK CITY.

Supervision of the food supply of New York City began in a crude way in the early days of the Department of Health, in 1870, when a clerk of the largest of our public markets was designated by the department as an inspector of foods to act without salary. He was given the power to seize and condemn such meats as came from without the city and was unfit for food. At about the same time milk inspectors and a chemist were appointed. At the present time there are one hundred eighteen inspectors connected with the Division of Food Inspection, forty-one assigned to general food inspection, nineteen assigned to country milk inspection, twenty-nine assigned to city milk inspection, and eighteen sanitary inspectors engaged in the supervision of physical conditions in establishments where food is prepared or sold. There are also four medical inspectors and seven veterinarians.

The board of health has the power to enact a sanitary code which becomes law on publication without requiring the approval of any other body or official. This code contains the fundamental principles of the control of foods and additional rules and regulations are promulgated by the board to govern certain industries which thus become part of, and have the legal force of, the code. The board has the power to control industries by granting of permits which is one of the most effective means of proper regulation, provided always that adequate machinery in the form of inspectors and clerks is available. Violations of the sanitary code may be punished criminally, the offense being a misdemeanor with a penalty of a maximum fine of $500 and one year's imprisonment, or both, or a civil suit for the recovery of a penalty of $50 may be instituted. The policy of the board has been to prosecute in the criminal courts all violations relating to the adulteration of foods. It is evident that the moral effect of this method of punishment is of the greatest value and such procedure has been deemed justified, especially when it seemed necessary in order to obtain the most effective results from the activities of a corps of inspectors which, considering the enormous field to be covered, is absurdly small.

At present, the following industries relating to foods and food supplies are operating under permits by the board and under specific regulations:

Dealers in milk and all places where milk is sold.
Slaughter houses, including poultry abattoirs.
Sausage factories.
Establishments for breaking out eggs.
Bottling establishments for so-called soft drinks.

All inspectors are appointed from civil service lists, having passed special competitive examinations. Food inspectors are qualified by examination as milk inspectors, meat and fish inspectors, general food inspectors. Milk inspectors are always limited to the inspection of dairy products or are used in country dairy inspections. The various classes of food inspectors are gradually trained to the inspection of all foods excepting dairy products. It must be borne in mind that, with our limited force, food inspection in this city must, of necessity, be principally confined to the physical examination of foods, the visual inspection, as in the case of animal products. Living animals are inspected at stock yards and slaughter houses; meat in slaughter houses, cold storage plants and butcher shops; fruits and vegetables at steamship piers, railroad terminals, wholesale and retail markets, stands, push-carts and stores; canned goods throughout the food stores.

In addition to this, samples of food must be taken for chemical and bacteriological examination for the detection of injurious ingredients and contamination, and to determine whether the contents conform to the label. A laboratory of eight chemists and seven technical and clerical assistants is maintained for this purpose, and the time of four bacteriologists and ten assistants attached to the general bacteriological laboratory of the department is required for food work.

Some idea of the scope and effectiveness of the work of food inspection may be obtained from the statistics appended to this paper, from which will be seen that nearly 24,000,000 pounds of meat, fruit, eggs, fish and other foods were condemned and destroyed during the year 1912. There were 423,732 separate inspections made of premises where meat and other foods are handled and sold. Of the 1,409 samples of food procured for analysis, 421 were found adulterated. The statistics of criminal actions show that, during the year 1912, 2,260 arrests were made by the Division of Food Inspection and in 1,900 cases fines to the amount of $14,070.75 were imposed by the courts. Already, during the first six months of 1913, fines to the amount of $10,923.50 have been obtained. All of the foregoing statistics are exclusive of milk inspection. During 1912, 125,642 inspections of premises where milk is sold in the city were made, 41,292 inspections of dairies and 1,909 inspections of creameries; 19,755 quarts of adulterated milk were destroyed, 1,763 arrests made, and $11,397 collected in fines.

MILK.

More attention has been paid to the supervision of the milk supply of New York than to any other branch of food control. As I had occasion to point out in discussing this subject last year at the International Congress on Hygiene and Demography, New York City offers, perhaps, the most conspicuous example of a municipality undertaking practically the entire supervision of its own milk supply all the way from the cow to the consumer. Most large cities, doubtless, exercise more or less jurisdiction over the sale of milk within their limits, but no other city that I know of has developed such an extensive system of inspection of dairies and creameries as is practised by the city of New York, notwithstanding that nearly all of the 45,000 farms on which our milk supply is produced are located outside of the city limits and more than 6,000 of them outside the state of New York.

One of the most interesting phases of this work is the legal basis upon which the authority of the Department of Health is thus exercised throughout an area covering portions of six different states. The board of health declares in its sanitary code that no milk shall be sold in New York City without a permit and the board maintains that it is entitled to ascertain the conditions under which milk is produced before issuing a permit to the dealer who buys that particular milk and brings it to the city. Under the operation of this system, it is rare that permission to inspect a dairy or creamery is refused, but, when this is the case, the dealer is notified that he must decline to receive milk from the farm under criticism or his permit to bring milk into the city will be revoked. In this way, milk from all farms not meeting the requirements may be excluded from the city. It will at once be evident that under this plan other communities, which receive milk excluded from New York City, are not properly protected. This exhibits the great defect of local control of milk supplies. It is undoubtedly far better that the Federal government and the states should undertake the control of milk production under adequate and uniform standards rigidly and uniformly enforced; then the municipal authorities could confine their activities to control of the supply after it reaches the cities.

There are two essential considerations in the control of a municipal milk supply which our recent experience has brought into great prominence. I have space only to suggest them at the present time. The first is the importance of pasteurizing practically the entire supply of general market milk of large cities. Whatever the theoretical advantages of an absolutely pure, raw milk, modern conditions and modern knowledge of the transmission of infectious diseases point to the pasteurization of all except special grades of milk as a necessary measure for the protection of the public health in large cities. We now realize that it is not economically feasible to insure the safety of the general milk supply of the city by means of inspection, for we know that thorough inspection would mean the repeated bacteriological examination of every person connected with the production of milk and, in addition, the continuous and expensive inspection of dairy methods and equipment, creameries, transportation, bottling and pasteurizing plants, stores and wagons, all of which should be done on a much wider scale than at present. The cost of such inspection as could really be depended on to insure safe milk would be prohibitive to the richest municipality. The alternative and the practical expedient, which keeps down the price of milk to the general public and at the same time insures its safety, is pasteurization, and it is a cause for congratulation that this procedure is being more and more employed in large cities and will, doubtless, become universal.

The second suggestion is that it is not economically feasible even with pasteurization to insure a general market milk that is safe and proper for infants. In New York we have, therefore, established an official classification of the milk supply which is the first and most comprehensive anywhere adopted and comprises the following grades:

Grade A. Milk suitable for infants and children.
Grade B. Milk suitable for adults to drink.
Grade C. Milk suitable for cooking only.

We have already actually accomplished the task of having every bottle and every can of milk coming into the city properly tagged with the appropriate grade label and we intend that every citizen of New York who buys milk shall be able to ascertain easily what grade he is buying.

NEW WORK.

Under a new state law all bakeries will have to comply with specific regulations, obtain so-called "sanitary certificates" and exclude all workmen suffering from infectious diseases. As soon as sufficient funds for an adequate force are provided, it will be required that every establishment, where food is manufactured, prepared or sold, be operated under a permit from the department and be subject to the specific rules and regulations. In the meantime rules and regulations are being prepared for each of these classes of places, which they will be required to post in plain view of customers. The educational value of this plan is self-evident.

Much greater stress is being placed by us on the importance of sanitary conditions surrounding the preparation and handling of foods and a corps of eighteen sanitary inspectors has been added to the food division. These men are skilled in the detection of unsanitary conditions, faulty plumbing, improper toilet facilities, improper ventilation and similar features, but have had no training in the inspection of foods.

STATISTICS OF FOOD INSPECTION.

Inspection of Foods other than Milk.

	1911.	1912.	First 6 months, 1912.	First 6 months, 1913.
Total pounds of meat, fruit, eggs, fish and other foods condemned and destroyed....	12,121,008	23,880,321	17,284,359	6,989,641
Total inspections of premises where meat is handled and sold......................	86,383	73,757	41,245	37,729
Total inspections of premises where other foods are handled and sold..............	392,879	349,975	177,577	175,089
Number of samples of foods procured for analysis..............................	1,013	1,409	663	793
Number of samples of foods found adulterated..............................	60	421	72	114

Criminal Actions—Food Violations.

New arrests............................	1,616	2,260	1,033	1,727
Discharged............................	172	255	163	157
Fines..................................	1,203	1,900	899	1,345
Amount of fines........................	$8,911.50	$14,070.75	$8,198.75	$10,923.50

Milk Inspection—City.

	1911.	1912.	First 6 months, 1912.	First 6 months, 1913.
Number of premises inspected where milk is sold..............................	104,670	125,642	53,943	99,507
Number of specimens of milk examined......	178,185	171,123	68,805	135,906
Number of quarts of adulterated milk destroyed............................	18,690	19,577	2,466	21,816

Milk Inspection—Country.

Number of inspections of dairies	32,269	41,292	23,854	14,560
Number of inspections of creameries	2,514	1,909	1,471	829
Dairies from which milk was excluded (City of N. Y.)	1,303	226	145	127
Creameries from which milk was excluded (City of N. Y.)		3	1	3

Criminal Actions—Milk Violations.

New arrests	657	1,763	692	1,403
Discharged	51	119	44	79
Fines	444	1,232	228	1,072
Amount of fines	$5,611.00	$11,397.00	$1,427.75	$7,310.00

FUNCTION OF VOLUNTARY ORGANIZATIONS OR AGENCIES IN THE CONTROL AND IMPROVEMENT OF FOOD SUPPLY.

Bailey B. Burritt,
Director, Department of Social Welfare, New York Association for Improving the Condition of the Poor.

Read before the General Sessions, American Public Health Association, Colorado Springs, September 9; 1913.

The function of voluntary organizations in the control and improvement of the food supply may be summed up in these words, "Inquiry or research, demonstration, popular education, coöperation with public agencies, legislation and coöperative efforts in distribution." In the development of the problem of a more adequately controlled food supply, voluntary agencies are in a position to play a very distinct and important part by supplementing the work of public agencies and by coöperating with public authorities in the directions indicated.

One of the fields in which they have been and can be most effective is in the field of inquiry into the social and economic problems involved and in research work relating to food supply. It is true that public agencies, and more particularly the Federal authorities, are more and more developing a spirit of scientific inquiry. In American municipalities, however, and even in individual states, it is difficult to secure public monies for research and experimental work. When there is a real problem presented, however, for the solution of which an accumulation of data is necessary, persons who at once have public spirit and means can usually be found who are willing to devote the necessary funds to making such inquiries. As an example of the type of such fruitful inquiry, I might cite, because of my intimate knowledge of it, an inquiry made during the past two months in New York City, by the Department of Social Welfare of the New York Association for Improving the Condition of the Poor, which I represent. This inquiry endeavored to gather evidence as to how great is the amount of short weighing and short measuring in that city. This association does a large relief work in New York City, purchasing some $75,000 worth of food supplies at retail during the course of a year. One thousand eight hundred and twenty-nine individual articles of food were purchased for families in the relief department. These were then carefully inspected in the homes of the families to which they had been delivered. These inspections were made by an official inspector of the Department of Weights and Measures of the city, who was assigned to the staff of the association for the purpose, accompanied by a man who had been in the food supply business for some eighteen years and who was for that reason competent as a judge of the quality of foods. Not only was the weight and measure checked but the quality of food was also approximately checked.

In addition to this a census was made of all of the stores for a section of the city including some seventy-five blocks with a total population of 104,000. It was found that in this district there were 503 stores handling food supplies, including 229 grocery stores, 132 meat markets, 46 dairies, 60 fruit and vegetable stores, 15 fish markets, 9 general markets and 12 stores selling tea and coffee. One hundred and seventy-eight of these stores were selected including a proportionate number of each of the types of stores. From these 178 stores selling all kinds of food supplies, 1,133 articles of food were purchased and delivered to homes in the neighborhood. These purchases were then inspected in the same way as described above. In addition a carefully prepared schedule was made for the purpose of securing information about the stores and the community. This information included the amount of business done by the store, the general cleanliness and sanitary condition, the number of hours the stores were open, information with regard to the amount of credit business done and various other information. The results of the inquiry were not tabulated in time for the preparation of this paper, and it is cited simply for the purpose of illustrating the field which exists for inquiries made by voluntary agencies. Although the results of the inquiry are not complete, it does seem to indicate that there is surprisingly little general deception in weight and quantity by the retail dealers of food supplies in New York City, probably due to the effective supervision of the Department of Weights and Measures and of the State Bureau. The percentage of purchases in which short weight was found varied from zero to 4 per cent. in the different stores.

No inquiry is likely to be very fruitful unless it leads to a definite program. The inquiry just referred to was undertaken not only for the purpose of securing evidence for the Department of Weights and Measures as to the general amount of deception in weight and quantity even though the weights and measures themselves were normal, but for the further purpose of being a part of a larger inquiry into the question whether it might be possible to effect any reconstruction of the method of distributing food supplies which would be economically and socially sound. The inquiry into this larger problem is now occupying the attention of the newly organized Bureau of Food Supply of the Department of Social Welfare. This inquiry is collating the available information with regard to the detailed methods and cost of distributing food in New York City under the present system. In particular, it is occupying itself with ascertaining where every part of the consumer's dollar goes. It, for example, is following up and pushing further the efficient work begun by the State Food Investigation Commission in the state of New York. Not only is an effort being made to ascertain what part of the consumer's dollar goes to the producer, transporter, wholesaler and retailer, but the details of the retailing expense and wholesaler's expense are being ascertained. Data have been secured which will enable us to distribute accurately the various items of expense involved in retailing food; that is, we shall know with at least very approximate accuracy how much it costs retailers to deliver their food, how much it costs for losses through credit, how much it costs for wages of clerks and help, how great the items for rent, heat, light, etc., are as well as other large items involved in the retailing of food.

As a result of the whole inquiry we hope to be in a position to answer intelligently the question whether any reconstruction of present methods will be possible, that is, whether it will be possible to supply equally good grades of food supply at any less cost to the consumer. This leads to the second function of voluntary organizations—that of demonstration. This is a peculiarly fertile field for the activities of voluntary organizations—to experiment and try out new proposals and to demonstrate their practicability or impracticability. It is exceedingly difficult to persuade public authorities to provide funds for experimental purposes and yet experiments point the path to progress. The voluntary organization, properly organized, can be an effective laboratory for the trying out of experiments in anticipation of their more general adoption by public authorities. If the inquiry referred to above should, for example, demonstrate the apparent practicability of any reconstruction in the method of distribution, it would be a most desirable thing to have the proposed plan tried out by a voluntary organization. This, indeed, is the aim of the Bureau of Food Supply. It would, so far as possible with the funds at its disposal, become a social experimental laboratory for problems relating to food supply.

One of the chief values of research work and inquiries of one kind and another and also the value of demonstration work is that it makes available material for the education of the general public. Popular education, therefore, becomes an important function of voluntary agencies interested in the food supply problem. Perhaps more effective work has been done in this field by voluntary organizations than in any other. The natural instrument of the education of the people of a municipality in the sanitation of food supply stores and other problems relating to food supply is the voluntary agency of that community, the consumer's league, the housewife's league, the women's clubs of various kinds, and the civic organizations. Popular education is a slow process. It is an indispensable part, however, of any program of progress in food supply problems. It can hardly be accomplished without effective work on the part of voluntary agencies. They are the *sine qua non* of the process. The too general tendency in this field is too great superficiality. A lack of sufficient inquiry into the fundamental facts involved before the campaign of education is undertaken; the all too frequent lack of a complete understanding and hearty coöperation with public authorities to the end that the educational work may result in more effective and more permanent results; these are some of the shortcomings of the present campaign of popular education in the matter of food supply. Campaigns are valuable but they can be made much more valuable if greater care be taken to base them on a more fundamental examination of the facts at the basis of the condition which the popular education is intended to remedy.

No voluntary agency can perform its function ideally without a thorough-going coöperation with the public authorities which touch in any way the field in which the voluntary agency is working. Each is incomplete without the other. With complete coöperation a health department or other public agency can be much more effective by planning with voluntary agencies, inquiries and activities which it itself cannot alone accomplish. The voluntary agency by making inquiries and by conducting experiments in coöperation with public authorities can assist frequently in formulating a constructive program for general adoption on the part of public authorities. A private organization is then in a position to effectively carry on the necessary campaign of public education and can coöperate with the department by assisting to secure necessary appropriations from the public appropriating authorities to make possible the carrying out of programs mutually agreed upon by the public department and the voluntary organization as desirable steps.

Too frequently petty friction is allowed to interfere with such coöperation as I have outlined much to the detriment not only of the public department and the voluntary organization but to the general public. Too frequently a spirit of antagonism prevails which interferes with possible progress. No effective voluntary organization can afford to wantonly criticise and antagonize a public department or be too impatient with the more or less inevitable delays in effecting changes, and *vice versa*, no effective and honest administration of a public department can afford to allow itself to become antagonistic to efficient voluntary agencies which command the confidence of the public. These misunderstandings and antagonisms too frequently cripple progress in the community. Lack of complete information about the work and the hopes of each other and the difficulties involved is responsible for much of the lack of coöperation. From an experience of several years in the activities of voluntary agencies working constantly with public authorities I speak with clear conviction of the great loss in efficiency and progress where through one cause or another a spirit of antagonism prevails between the private association and the public department. Complete coöperation is the key-note to real progress.

In the field of legislation, the private voluntary association can be effective. Too frequently, however, efforts to secure needed legislation or local ordinances are made by voluntary agencies without an adequate preliminary study of the fundamental facts involved. Superficial legislation is the inevitable result. With thorough-going preliminary preparation, however, and with adequate coöperation with public authorities, the voluntary agency can be most effective in this field. Its motives in urging the legislation are disinterested and its arguments for this reason have greater weight with legislators and public officials.

A considerable contribution to the problem of food supply has been made in England and other countries through coöperative efforts in distribution. There have also been many efforts made in this country. The mortality among such efforts, however, has been relatively high. A considerable number of coöperative stores exist, many of them leading more or less precarious lives. The time has probably not arrived in this country when people are sufficiently thrifty or when the pressure upon the problem of food supply for mere subsistence is sufficiently acute to ensure the success on a large scale of coöperative efforts. The population, particularly in our eastern communities is also too heterogeneous to make possible an extensive development of the coöperative store. Where the successful store does exist, however, it does seem to contribute to the problem by ensuring an honest quality and quantity of food to the consumer in such a way that a good return is made to the consumer for his money. A slow but persistent growth of coöperative efforts is likely to take place but it is extremely doubtful whether this extension will be sufficiently rapid to affect appreciably the general problem within the next generation.

These to my mind are some of the more important functions of voluntary organizations in the problem of food supply. Particular activities in any given community will depend quite largely on the status of activities of public agencies relating to the people in that community. Pushing the boundary of effective public activities is the key-note of the purpose of voluntary activities. As rapidly as it is found possible to turn over, after inquiry and demonstration, any activity to the direction of public authorities the voluntary association moves on to still other untouched realms. Its functions never cease for this reason. It should never assume permanently activities which should be carried on by a public department. It is, however, the field of experiment and of supplement to the public department. The progress of the public is served best when each is efficiently functioning in its own field and effectively coöperating with the other in its activities.

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Public Health Officials
Chairman, Dr. C. V. Chapin, Providence, R. I.
Vice-Chairman, Dr. C. J. Hastings Toronto, Canada.
Secretary, Dr. E. C. Levy, Richmond, Va.
Recorder, Dr. A. S. Fell, Trenton, N. J.

Sanitary Engineering
Chairman, Mr. R. S. Weston, Boston, Mass.
Vice-Chairman, Mr. George W. Fuller, New York City.
Secretary, Dr. H. D. Pease, New York City.

Sociological
Chairman, Mr. Lawrence Veiller, New York City.
Vice-Chairman, Dr. H. E. Dearholt, Milwaukee, Wis.
Secretary, Mr. S. Poulterer Morris, Denver, Col.

THE PLACE OF THE PURE FOOD AGITATION IN THE PUBLIC HEALTH CAMPAIGN.

Perhaps the most important duty of the public health official is to concentrate the funds at his disposal, and to direct the voluntary agencies which look to him for leadership, along lines which are most productive of results. Such funds are very limited, and such agencies weak, compared with the tasks to be accomplished. There are many directions in which all the forces available can be concentrated with a reasonable assurance of practical results in the lengthening of human lives. There are other directions in which energetic efforts will make the community a cleaner and more pleasant place to live in, but cannot be expected to produce any appreciable effect upon the death-rate. The responsible sanitarian must seriously consider under which of these heads any given activity falls, and must see to it that those of the latter class are not allowed to encroach too largely upon the former.

In the case of the agitation for "pure food" it is particularly difficult for the health officer to keep his head, either personally or officially, in the face of the brilliant publicity campaign which has been carried on by a number of scientists and pseudo-scientists during the past five years. At least two magazines and several sensational newspapers are constantly bending their energies to the service of this cause, and many women's organizations are actively enlisted in it. Some of the leading exponents of this crusade hesitate at no exaggeration or misrepresentation of scientific fact, and deal with the reasoned and conscientious opposition of experts by vindictive attacks upon such men as ex-President Remsen, Professor Long and Professor Sedgwick,—attacks which discredit their authors with those who know but which must have their effect upon the uninformed. It is often with some difficulty that the layman is persuaded that the whole pure food question is an ethical and scientific problem, not a popular melodrama, centering about a corrupt food poisoner overthrown by the glittering pen of a champion of the people.

From the ethical standpoint the passage of the National Pure Food Law and its vigorous enforcement, with the enactment of similar laws by many state legislatures, has been a notable public service. No one can doubt that foods and fabrics and other articles of merchandise should be what they purport to be, and laws requiring correct labeling deserve and receive the support of all honest men. The enforcement of these particular laws usually lies with the health department rather than with the police department, and it is the duty of the health officer to execute them as fully as the resources given him for the purpose will admit. In asking for increased appropriations, however, he must necessarily balance the practical returns in life and health to be expected from food inspection against those to be derived from other departmental activities.

Adulteration, the use of preservatives, and decomposition are the three chief evils denounced by the pure food champions; and it may be well to say a word as to the sanitary significance of each.

The ordinary adulterants, in the first place, are not poisons. Cotton seed oil, glucose, chicory, ground cereals, hulls and starches, clay, coloring matters, may be menaces to the public pocket-book but not to the public health. With a few very rare exceptions it may be said that the substances used for illegal substitution in food products are no more unwholesome than the more costly ones which they replace. They are usually less nutritious but since they affect special rather than staple articles of diet their effect upon public health is so far as we know infinitesimal. The conditions which obtain among cattle or among Asiatics who live almost exclusively on polished rice bear no relation to the effects of an ordinary mixed American dietary and such claims as that America is starving because of the abstraction of mineral nutriments from the diet are, of course, the purest moonshine. In all this it should be understood that we are speaking of foods only, not of drugs. The purity of drugs is a much more serious matter, for drugs are used in exact amounts and frequently contain highly poisonous and habit-forming compounds. The new director of the Bureau of Chemistry has done well to focus public attention upon this point.

The preservatives, at which such horror is expressed if they happen to be unusual "chemical" preservatives rather than more familiar "natural" ones (benzoate for instance instead of the chloride known as salt), are of not much more practical sanitary moment than the adulterants. In regard to benzoic and boric and salicylic acids and their salts, the sulphites and even formaldehyde in the quantities in which it is found in foods, the conflict has raged and still rages as to the significance of the physiological effects which may be demonstrated. The practical conclusion to be drawn from it all is that if any harm is done it is so slight that some of the best and most disinterested physiologists and chemists are still in doubt as to its reality. It is probable that certain preservatives in certain amounts may gradually injure very sensitive persons. This is a good reason for indicating their amount but not necessarily for forbidding them; and the fact that it has not been proved that some one may not suffer imperceptible deteriorative changes from a long-continued diet of ketchup containing sodium benzoate need not weigh very heavily with a health officer who knows that hundreds of lives are being lost every year from communicable disease which he could save if he had the time and funds to do it.

The main argument against food preservatives is of course that they are generally unnecessary and that they may be used to cover up and conceal decomposed or decomposing food products. This brings us to the third problem of decomposition, which involves more real danger than the others. We know that people have been made sick and have died from consuming decomposed meat or meat from diseased animals. It is apparent, however, that as a rule only food infected with, or decomposed by, certain specific organisms is dangerous. We have unfortunately as yet no method of distinguishing the dangerous, from the harmless decompostions, except from experience of their effects. The only practicable policy is to exclude all unusual decompositions and meat from diseased animals so far as possible, and even this is of limited service as in a large proportion of authentic food poisoning cases the trouble has occurred in the kitchen or pantry after cooking, where its control is beyond the reach of the health department. It is certainly important that diseased and decomposed animal foods, in particular, should be sought out and condemned. It is probably even more important that foods should be protected against specific infection, by flies, filthy fingers and the like in the store and in the kitchen. Yet when one considers the effect of food poisoning upon the vital statistics of a city even that function of the health department, although an essential one, is not one of the most effective weapons in reducing the death-rate.

Altogether the movement for "pure foods" has been a distinct triumph for the cause of honesty, and tends to improve the general quality of food supplies from an economic and esthetic standpoint; but it is a very minor factor in the public health campaign. On the other hand the pure food movement has had distinctly unfortunate results, which in certain cases have more than outweighed its good effects. We do not, of course, refer to existing activities of the Federal Bureau of Chemistry, which under its present direction is a force to be relied upon as upright and judicious and wise; or to the activities of most state and city health departments; but to the sensational efforts of uninformed writers and speakers. The first evil effect is the discrediting of second-grade but perfectly safe foods. It must be remembered that the public has a double interest in this whole question. It must be protected on the one hand from such real dangers as unfiltered water or raw milk. On the other hand it is almost equally necessary, from an economic point of view, that all food-products, which can be used with safety, should be available for the community. It is probable that in the future our practise in this country will more closely approximate that of Germany, which makes possible the use under proper regulations of much that we now destroy. The attempt to discredit perfectly healthful foods by enumeration of some of their innocuous chemical constituents with subtle innuendo is a habit which is far too common with those who object to adulterated food but have little scruple about adulterated science.

Another evil aspect of the pure food agitation is that it is ordinarily bound up with a more or less violent attack upon authoritative experts and particularly upon public health authorities. There are public health authorities who need attacking. When, however, onslaughts are continuously made upon excellent departments such as those of New York and Philadelphia, it cannot fail to exert an unfavorable effect upon public opinion. The public health movement is largely an educational one and while it is essential to have upright and intelligent leadership, it is almost as necessary to have the public realize that such leadership exists, and place its confidence in trained scientific leaders rather than in sanitary quacks.

This brings us to the crux of the whole matter,—the most serious evil of the pure food agitation as it is often conducted. Over emphasis on this phase of public health work almost inevitably means neglect of other phases which are of much greater moment. It would, perhaps, be esthetically desirable to have a great force of men at work in the exclusion of second-grade food if the community could afford to do without such food. If, however, the money thus spent ought rather to be used in securing a safe water supply, in promoting the proper pasteurization of milk, in enforcing the isolation of communicable disease, in vaccination for smallpox and typhoid fever, in administering antitoxin for diphtheria, in school inspection, in caring for tuberculosis and in an educational attack upon infant mortality, —then those who urge it are taking the grave responsibility of crippling really efficient weapons in the public health campaign for the sake of activities which have only a remote relation to the problem of lengthening human life.

THE COLORADO SPRINGS MEETINGS

The Colorado Springs Meetings of the Association were markedly successful. Despite the long distance, one hundred and ninety-six members were present, and they were accompanied by seventy guests.

The meetings of both the General Sessions and sections were very attractive and valuable in many instances. The secretary reports the election of one hundred and ninety-six new members since the Washington meeting, or a total increase in membership of three hundred and ninety-six since the Havana meeting. This represents nearly an increase of fifty per cent in this short time, and is a decided indication of a growing interest in the work of the Association.

The complete list of new officers elected appears on the first editorial page of this issue. The Association is to be congratulated on the election of Doctor William C. Woodward, Health Officer of the District of Columbia, to the presidency.

The hospitality extended in Colorado Springs, not only to the members but to the ladies and guests as well, was unusually enjoyable and well planned, and Doctor Omer R. Gillette, Health Officer, and Chairman of the Local Committee, received and deserved a great deal of praise for the thorough manner in which the entertainment of the members and guests was attended to.

The next meeting of the Association is to be held in Jacksonville, Florida. The exact date has not yet been determined, but will be announced very shortly.

THE ROLE OF CONTROLLED AND GUARANTEED ADVERTISING IN THE CONTROL AND IMPROVEMENT OF FOOD SUPPLIES.

RICHARD H. WALDO,
Advertising Manager, Good Housekeeping Magazine, New York City.

Read before the General Sessions, American Public Health Association, Colorado Springs, September 9, 1913.

Nine hundred years ago a merchant of Lyons translated the Bible from priestly Latin into secular French. To him was given excommunication, the bitterest stigma of that day. Seeking to render service, he died an exile from his father's church and the land of his mother's kin.

Today a descendant of that man is doing what he may to translate advertising, the Gospel of Modern Business, from doubtful Promise into definite Truth. To him is given the privilege of appearing before you, the greatest honor that has ever come to an advertising man. I fare better than my ancestor. He had to go 200 miles on horseback to escape his enemies, while I have come 2,000 miles by railroad to meet my friends.

For it is my hope that I may call you friends. Each man among you has a chosen work—a work that serves a public need. It is of such men as yourselves that Kipling wrote in his lines:

"Not as a ladder from Earth to Heaven, not as an altar to any creed,
But simple service, simply given, to their own kind in their common need."

If I can leave with you the knowledge that men in our calling see Social Service as the Thing Worth While, you may be willing to give me and my brothers a friend's God's speed along our common road. It is with this hope in my heart that I shall tell you of the rôle that advertising will play in guarding the food stuffs of the nation.

When I received the invitation to address you, I asked my good friend, Dr. Pease, what I could say to interest this body. He said, "Tell them about getting Dr. Wiley to resign, about his work with you, and what the business world thinks of it." So if I deal largely with the work of a single publication, it is because it presents actual results rather than interesting hopes. And because those results have come largely from the genius of one man, I shall talk much about one of the most distinguished of living Americans, Dr. Harvey W. Wiley.

Two years ago, almost to a day, I suggested to Dr. Wiley that it was time for him to resign from government service. He replied, "Lots of people think that—have you any new reason?" The event proved that my reason was new, and six months later—March, 1912—every newspaper in the country carried the news that Dr. Wiley had resigned. They put it this way—to become contributing editor of "a monthly magazine for women," name carefully suppressed. For we have our professional jealousies, and the veriest tyro could see the wonderful advantage a publication would have in getting the famous fighting Doctor on its staff. Slower to be seen was the fact that the Doctor stood new armed, better equipped than ever before to carry on his life work. A powerful magazine absolutely at his command, and behind that the reserve force of newspapers circulating over two million copies daily, placed the strong hand and powerful brain where they could direct the fight from a redoubt not to be captured by political stealth or hired clamor. It is good to tell you that there are few opponents of pure food to whom the Doctor's power is not clear today; there will be fewer still within a twelve-months time.

The invitation to Dr. Wiley to become contributing editor carried with it an equally attractive plan—That he should pass upon, as speedily as possible, the fitness for advertising of all foods, drugs and toilet accessories. In 1908, he had attacked, in an address before the Sphinx Club of New York, the labels, circulars, and general advertising matter used by these classes of goods. We pledged ourselves to abide absolutely by the Doctor's findings, to appoint no "Remsen Board" to review his work, and to throw out forthwith all advertising that should receive his unfavorable criticism.

It was this phase of the new work that brought the Doctor to us. I have since learned from the very distinguished editor of a great national weekly that an annual salary of two and one-half times the amount we offered was declined because the work was purely editorial. That fact will perhaps interest the members of this association, since so many of you have also chosen to devote your lives to public service rather than to private profit.

It is fair to say that the Lederle Laboratories are largely responsible for our confidence in the probable results of Dr. Wiley's new work. For a year previous to his coming we had received from the Laboratories monthly criticisms of all our food and drug advertisements. Based on these criticisms, we estimated a loss of about $50,000 in advertising revenue, and we were more than willing to lose it. Although the total cancellations resulting from Dr. Wiley's drastic censorship have reached nearly $100,000 within the year, we are still perfectly content. For the loss has all been made up, and $125,000 gain has been added to it—a condition of affairs that is giving other, and but recently scoffing, publishers food for thought. Even the scoffers are quite willing to concede now that it is possible to be financially successful and yet rigidly exact in the acceptance of advertising. They, too, see with the natural relief of fine men that there is no occasion to have in advertising

"Right forever on the scaffold—
Wrong forever on the throne."

Yesterday it was the feeling of the business world that advertising was necessarily dishonest—at least necessarily inaccurate. Today there is the growing belief that the throne of success belongs to Truth, and to Truth only. The wrong of unfair competition—the competition of lying—is on the way to the scaffold, and advertising is become a servant of Right, through the simple use of Truth.

Were one inclined to the philosophical, one might say that the present very strong trend toward homely truth in advertising is of a piece with many another reform which has made more noise in the world. It is a return to first principles.

In the beginning, the Mercuries and Intelligencers of the New and Old World bore simple announcements from importers and merchants that spices or whatnot had been received and were on sale. These were genuine news items, though paid for, matters of information useful and interesting to prospective purchasers.

Jump along a generation and you enter the era of Holloway's Pills and panaceas for every disease; and unlimited, picturesque—*lying*. Now we are simply returning to the ancient principle and insisting that advertising shall be *information*—something to guide and instruct the possible buyer.

It seems like a little thing; it would be a little thing were it not for the vast sums of capital that were, and to a certain extent still are, staked on deceitful advertising. Macaulay said that if any vested interest had been concerned in denying Newton's law of gravitation, it would have remained the subject of debate forever. Vested interests, immense manufacturers of food and other products, are today vitally concerned in burking truthful advertising. But the whole current of the age is against them. We are in an era of return to simplicity and every day veracity, and the Goliaths of fraud will have to fall before the David's little but deadly sling of truth-telling.

One such an example of success as Dr. Wiley's censorship is worth, to the average publisher, ten years of philosophizing. Where a purely ethical treatment is made the basis of a big financial success there is an astonishing awakening of interest and enthusiasm. Being good appeals to most men; making money appeals to more. To do both at once is a proposition that few men will ever try to get away from.

There have also been some very significant recent changes in the attitude of manufacturers. It is but fair to say that our sincerity in the radical steps we took was freely questioned. The cancellation by us of big contracts drove conviction home, however. Postum, Grapenuts, Steero, Dr. Lyon's Tooth Powder, Occident Flour—these are but a few of the many big-advertisers whose room is preferred to their company. Either in quality of product or its description they are below standard, and so their money is no good, as other manufacturers clearly understand. In fact, it is a bit amusing to see the doubters piling into the Chariot of Grace, now that they are convinced it is the Chariot.

Dr. Wiley's system of separating the sheep from the goats is very simple, but as it is quite original, I shall venture to describe it. Specimens of the various forms used in the work will be sent, with the greatest pleasure, to any member of the association on request.

Samples of foods, etc., are purchased in the open market in New York, Chicago, or Boston. Manufacturers' own samples are never accepted. These purchased samples are forwarded to the laboratory in Washington, where analyses are made by men who worked for many years under Dr. Wiley in government service. Next, the label, circulars, etc., are read by Miss Anne Pierce, for twelve years editor of pure food bulletins in the Department of Agriculture. The results of these two examinations are placed before the Doctor, and they are made the basis for the system of mathematical ratings employed to indicate our findings.

Shredded Wheat is an example of a first-class product properly and truthfully described. It is rated thus:

For freedom from chemical preservatives, or other injurious substances,	50 points.
For quality, based on analysis,	25 points.
For descriptive claims,	25 points.
A perfect score,	100 points.

There are but few articles which attain this glory. But if all deductions made leave a rating of 90 points or better, a card is issued notifying the manufacturer that his product is in the star classification. If the rating falls between 89 and 75, he is given the exact figures, and the reasons for reaching them. A similar card goes out where a rating of less than 75 is accorded, with a clear statement to the effect that this is a very poor rating, indeed.

These rating cards, giving results, are the first intimation to the manufacturer of the examination. Most concerns evince a lively interest in the ratings and the means by which they are worked out. Some do not, but they are very much in the minority. The majority thank us heartily, especially where we show discrepancies between the actual composition of the product and its labeling. The letter of one such manufacturer is typical of many that have come to us. He wrote:

> "We shall be glad to eliminate both phrases. That is the old original talk put there 45 years ago. I have not read it myself for 20 years—I can't find anyone about the plant who has read it within ten. We shall have that 'conversation' off the label within 90 days. It is antiquated, it was absurd to begin with, and I don't believe it ever sold a dollar's worth of goods to anybody."

There we have the modern view—that mere "conversation" is worthless for selling good merchandise. The truth, conservatively stated, is the one sure means of getting and holding public favor. It is rapidly becoming the basis of all mercantile success. So it seems to us rather curious that this straightening out of labels and circulars has been undertaken as a commercial rather than a governmental matter—almost as curious as the fact that the service evidently fills a want long felt by manufacturers themselves.

Not that the work is all beer and skittles, however. Dr. Wiley is as roundly abused as ever he was, and I come in for my share. That keeps the work from monotony—and the Doctor knows he is drawing blood when galled jades wince. We have been called all the necessary and unnecessary names in the list, but we think there are more coming.

A book giving the results of a thousand analyses is to be distributed. Good, bad and indifferent are to be made known by name and address. Forty-seven per cent. are first class; 35 per cent. are poorly labeled, and 18 per cent. should be barred out of commerce altogether.

It is this minority of 18 per cent., bulking so unduly large in the record, that will shortly find advertising in reputable publications absolutely barred to them. Without advertising, they will wither as plants without water. For they must ever find new purchasers, since the old do not repeat, and it is wholly within the province of publishers—more, it is their clear-cut duty—to close their columns to such advertising. Publishers are increasingly accepting this as a fact not open to question.

Mr. H. G. Wells has described the situation finely. He says: All written history is the story of a minority, and their peculiar and abnormal affairs. It is the peculiar and abnormal affairs of 18 per cent. of the food stuff manufacturers of this country that are making the history of the pure food movement. By the grace of God and help of the police, we shall have their affairs still more peculiar within a very brief time.

For we unquestionably have the public with us. Unlimited support is certain for every phase of pure food work that is truly a public service. I say with profound conviction to you gentlemen, that you cannot go too far, if the basis of your work is right. It is simply another illustration of what Mr. James J. Hill says: The man who "sells" the American nation is a fool. This nation is rising to heights undreamed a decade ago. The man who helps their dreams come true shall have success limited only by his vision. So we have found it in our own work.

We hold that rigid censorship of food advertising, based on adequate analyses, will kill by starvation the unworthy and the untrue. We hold that advertising can exercise a police power that will wipe off the commercial map the adulterator and misbrander. And, what is of the highest importance, we have proved beyond possibility of challenge that there is profit as well as pleasure in this work.

Sometimes, as we all do, I lose sight of the woods for the trees. The heat and burden become wearisome, and I am given over to doubts. That's the mere weakness of human nature, however, and in all of us there are other, finer qualities. These do but wait the call to help the Larger Good, once let that Larger Good be set clearly forth. Dr. Eliot, President-Emeritus of Harvard University, has expressed this beautifully in the thought with which I shall bid you farewell today:

"Let all the ends thou aimst at be thy Country's, thy God's, and Truth's. Be noble—and the nobleness that lies in other men—sleeping but never dead—will rise in majesty to meet thine own."

REAPPEARANCE OF THE GHOST OF MALTHUS.

William T. Sedgwick, Sc. D.,
Professor of Biology and Public Health, Massachusetts Institute of Technology, Boston.

Read before the General Sessions, American Public Health Association, Colorado Springs, September 9, 1912.

"Towards the close of the eighteenth century, a sudden glow of sanguine faith in man's future spread over the world. A new era seemed to be opening for humanity. Not only the unthinking multitudes, not only the young and ardent, but the old and the contemplative, dreamed of perfection as well as progress—of a state of things in which every man, having enough of the necessaries, comforts and even luxuries of life, should have no motive to envy or despoil his neighbor. But in 1798 an unpretentious Essay appeared, from the pen of an English clergyman of singular benevolence, modesty and piety, which rudely shattered all such brilliant pictures of an earthly paradise and overwhelmed the philanthropic dreamers with despondency and gloom."

So wrote in substance one of the most sober and thoughtful of the critics of Malthus, some seventy years after this epoch making work was published.* But a still greater shock than that inflicted by Malthus must have been felt by believers in the speedy coming of a social millennium when, almost before the ink was dry on Godwin's work entitled "Political Justice and Its Influence on General Virtue and Happiness," to which the Essay of Malthus was primarily a rejoinder, the French Revolution broke out bringing terror to all. And when only a dozen years after Malthus' death in 1834, a frightful famine ravaged one of the most fertile of the British Isles, his Essay was vividly recalled. It was in Ireland, that "the population increased from 2,845,932 in 1785 to 5,356,394 in 1803. They married and were given in marriage. Wise men foresaw the deluge but people who were already half starved every summer did not think their case could well be worse. In 1845 the population had swelled to 8,295,061, the greater part of whom depended on the potato only. There was no margin, and when 'the precarious exotic' failed an awful famine was the result."† Elsewhere in Europe there were also famines in the nineteenth century, but none that came so near home to Americans as that here referred to which was caused by overpopulation, poverty, and especially a total failure of the Irish potato crop.

For American biologists Malthus and his doctrines have been kept alive largely through Darwin's acknowledgment of his fundamental indebtedness to Malthus, for Darwin states that it was while dwelling upon the checks to the natural and unlimited increase of the human species, as laid down by Malthus, that there flashed into his mind the idea that in the struggle for existence due to overpopulation there must be a natural selection bringing about survival of the fittest. In other respects Malthus and his doctrines have had chiefly an academic interest for Americans hitherto, and for obvious reasons. America has long been and still is the "new" world. It has been occupied by civilized man only about three hundred years, whereas the "old" world as we still call it—namely, Europe, Asia and Africa, and especially Asia—have certainly been thus occupied as many thousands of years and probably much longer. When the French sailed along the coast of Maine and established their temporary settlements three hundred years ago, and when the English at about the same time settled on the soil of Virginia and of Massachusetts, they found only a very sparse population, and that composed of savages living mostly upon wild animals. At that time the soil was absolutely a virgin soil. But ever since then emigration to America as well as natural increase have steadily and rapidly added to the population; and so slow and gradual has been this change from wilderness to fertile fields and urban life that even yet American life is preëminently rural.

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*W. R. Greg. Enigmas of Life, 1872.

†Encyc. Britt. 9th Ed., XIII, 270.

The time is apparently at hand, however, when, after three hundred years of immigration and natural increase with a for the most part comparatively crude agriculture, the population of the United States is beginning to encroach seriously upon the means of subsistence, and for the first time in history the ghost of Malthus may be descried approaching our shores. It is not easy to show beyond peradventure that there is serious danger ahead, but so many straws indicate that the wind is blowing in this direction that all students of food problems should be watchful and preparing to meet the danger if it comes.

The tendency of population to increase more rapidly than the means of subsistence was only too familiar to the ancients. Plato and Aristotle carefully considered the problem and undertook to solve it in their theoretical discussions. More recently Hume and many others have been interested in the question of the populousness of nations, but it was Thomas Malthus who, in 1798, first really fixed the attention of the modern world upon this great problem. So startling was the effect of Malthus' treatise (which is in fact a large and solid volume rather than an "essay") and so unfamiliar and unpopular are his doctrines in America today, that we shall do well to recall very briefly their more salient features.

Malthus' title is "An Essay on the Principle of Population," the principle involved being the theory of the improvement of society. As already stated, it is really a rejoinder to a glowing work of William Godwin on the perfectibility of human society, Malthus holding that for the improvement of mankind two things are needful, namely, first, to investigate the causes that have hitherto hindered the progress of mankind toward happiness, and second, to consider the probability of the total or partial removal of such obstructions in the future. Malthus deals chiefly with only one of these, namely, *the constant tendency of all living things to increase beyond the food supply.* It was this universal tendency to enormous and indefinite multiplication which Darwin seized upon as one cause of the universal struggle for existence, and this in turn as the basis of natural selection or survival of the fittest. "Malthus worked out his problem relentlessly and came to the conclusion that, when unchecked, population doubles itself every twenty-five years. It has even been calculated that it may double in thirteen years." Computations of this kind are comparatively easy, but much more difficult are estimates of the possible increase of food supply. Can this also be doubled in twenty-five years? Here the answer depends upon the conditions with which we start. If these are essentially those of the crudest form of agriculture, then unquestionably the answer may be in the affirmative, but obviously only for the first or the second twenty-five years. In the third or fourth twenty-five years the problem would be much more difficult and we soon reach a condition in which we must abandon the geometric ratio for increase of food supply though not necessarily for population; hence, applying this idea to the whole world population increase soon outruns food increase and famines arise.

Malthus's famous Essay, because of its convincing character and fundamental significance, has always had the most respectful consideration of economists, although both author and essay, because of the pessimistic note involved, have at all times been roundly abused and even detested by optimists and others who for one reason or another dislike the cold facts and unwelcome conclusions which the Essay presents. John Stuart Mill, however, and all other important economists from Malthus's time to this, have paid close attention to his views, but as already stated these have hitherto had but scant attention from the average American. The reason why is sufficiently obvious. Dwelling as we do in a new world with almost unlimited areas of virgin soil; possessing a population sparse in comparison with that of the old world; wonderfully favored for the most part by climate and rainfall, the North American continent has hitherto enjoyed not merely food sufficiency but food abundance. "Bumper" crops have repeatedly followed one another in quick succession, and a fortunate adjustment between industrialism and agriculture has hitherto kept our population comfortable. All this too, has continued in spite of rapid natural increase of population, to which has been added enormous immigration. Of recent years, moreover, a diminishing birth rate, at least in certain classes and communities, has acted favorably in restricting overpopulation, although a declining death rate has worked in the opposite direction.

At length, however, there are many and significant symptoms of an approaching change. Most conspicuous of these is the so-called "rise of prices," and although this rise is doubtless due in large measure to other causes, such as an overproduction of gold, it is difficult to avoid the belief that some of it at any rate is due to a diminishing food supply associated with an increasing demand for food.

Until quite recently the flesh of wild animals was to be had in our markets in competition with that of domesticated animals, *e.g.*, prairie chickens, partridges, venison and wild ducks, while formerly bear meat and the like were often met with. Now, however, in the east the prairie chicken has disappeared, the sale of partridges is practically forbidden, and venison and other forms of game are sold only under the narrowest restrictions. It is notorious that game animals are rapidly disappearing except where special pains are taken for their conservation. And the same thing is true of wild fish. Our eastern shores formerly swarmed with lobsters, clams, oysters and other shell-fish, while cod, haddock and similar ground fish were both abundant and cheap. Today lobsters are very scarce and dear and apparently rapidly disappearing, and the same is true of clams and oysters excepting where these have been specially preserved, while cod, haddock and the like fetch two or three times as much a pound as they brought even twenty years ago. Beef, formerly cheap and abundant, is now scarce and dear, with prices steadily rising, and the same is true to a greater or less extent of other animal foods such as lamb, pork, veal and eggs.

Our exports of surplus corn, wheat, beef and the like are also either actually diminishing or diminishing in proportion to the population, while, on the other hand, our exports of manufactured goods are rapidly increasing;—all of which means that we are gradually changing from an agricultural country, characterized by abundant food production, into an industrial nation, characterized by heavy food consumption and relatively moderate production.

Another significant phenomenon of the last fifty years is the enormous development of urban life in America. Fifty or a hundred years ago large cities were few, while today they are abundant and, acting like magnets, attracting an ever increasing immigration from the rural districts. Conversely, rural depopulation is a marked feature of many districts once given over to agriculture but now growing up to wilderness or forest, and it needs only the briefest reflection to perceive that in this movement vast numbers of persons are shifted from the ranks of food producers to food consumers and, therefore, effectively diminish the available supply.

Happily, we have not yet reached or even approached the terrible conditions which prevail in countries suffering from really serious over-population, such, for example, as those described for China by Professor Ross of the University of Wisconsin in his interesting volume entitled "The Changing Chinese."

Less than ten years ago my friend, the late Edward Atkinson, one of the most prominent economists of his time, but an inveterate optimist, assured me that Malthusianism was now really dead and even the ghost of Malthus forever banished. Cheap fuel and power were to come soon from peat and later from sunshine, and cheap food from intensive agriculture. Lentils were to replace animal food and slow cookery using little heat, and therefore cheap, to make coarse foodstuffs appetizing as well as nutritious.

But what do we actually see? A population already vast, and increasing by leaps and bounds; a virgin soil largely ravished and already showing signs of exhaustion; timberlands mostly depleted; wild animals and game almost exterminated; exports of foodstuffs diminishing; huge cities growing up side by side with rural depopulation; fisheries, and especially shell-fisheries, showing ominous symptoms of coming failure; and everywhere outcries and complaints of the high cost of living. Meantime, although the cost of coal increases nobody seems to be using peat for power, very few want lentils in place of meat, fish or eggs, although these staples are already dear, while intensive agriculture has thus far failed to put in an appearance, or at least to reduce the cost of cereals, fruits or potatoes.

If it had not been for three great scientific inventions, namely, cheap *transportation*, the art of *canning* and conservation by *cold storage*, the cost of wholesome foods would be today far greater than it is. These three alone at present keep the ghost of Malthus in the background. These alone save the surplus of one place or season to overcome the scarcity and want of another. If it had not been for these, prices would today be much higher than they now are, and the ghost of Malthus not merely vaguely discernible in the distance, but a palpable and startling spectre.

Improved transportation became effective early in the nineteenth century with the application of the steam engine to railroads and steamboats, and its wonderful development and efficiency in transporting the surplus of one place or time to overcome the scarcity of another place or time are familiar to us all.

The art of canning dates from Appert, a French technologist, who first preserved fruits and the like by a kind of canning about 1810. One of the earliest, if not the very earliest, canner in this country was William

Underwood of Boston who, about 1820, began to apply the principles of Appert, and whose descendants are still engaged in the same business in the same city. Many of those still living can remember easily enough when canned foods were either non-existent or rare, and how recent the enormous development of the canning industry is may be appreciated when it is stated that in our Civil War canned foods were practically unknown.

Cold storage is even more recent in its beneficent influence upon the conservation of the food supply of the United States. For although the principles involved in cold storage have been known and acted upon from the earliest times, ice houses and domestic refrigerators were almost unknown fifty years ago, while cold storage plants equipped with devices for producing cold artificially have only been common for a score or thereabouts of years.

When we reflect upon the comparatively easy transfer of vast quantities of food from one region to another by rail or steamship, and upon the enormous amounts of food now canned and otherwise preserved, and finally upon the millions of eggs, tons of butter and cargoes of beef, fish and fruits kept in cold storage, it is not difficult to realize how much these three inventions have had to do with keeping the wolf of hunger away from the homes of Americans by the successful conservation of perishable food.

It is not, however, enough that these three inventions should exist. In order to make them effective, some return must be made for all of them. A poverty-stricken country cannot buy food, even if famine comes, and *wealth* is no less essential to the securing of a proper food supply than are the transportation of food and its preservation and cold storage. It will not do to assume that even the three great inventions referred to, either alone or taken together, are sufficient to prevent famines and hunger. Transportation was fairly well developed between the British Isles in 1847 and, doubtless, there was food enough for Ireland at that time within a very few hundred miles. *Poverty* played the leading rôle then as it generally does in famines. Game and other excellent foods are sometimes exported from one part of China while devastating famine is ravaging another part. The food supply problem has at the bottom an economic basis and it is probably safe to say that today no country need dread a shortage of food provided it enjoys wealth widely distributed. Such a condition, however, neither exists anywhere nor is likely to exist in the near future. On the contrary, we must start with the assumption that for some time to come poverty is likely to be always present among large numbers of any population, so that the problem of food supply becomes almost hopelessly complicated. No one will go to the trouble and expense to provide quick or abundant transportation, or canneries and canned food, or cold storage warehouses and cold storage plants, unless somebody is ready and able to pay for all these things.

Anyone who notes the tendency of the times, or who observes that on the continent of Europe the meat problem, as for example in Germany and Austria has become so acute that in the former not only much horse flesh but also dog meat are now being used, can fail to recognize the fact that in spite of improved agriculture and the opening of the vast areas of the new world, both North and South, there is imminent danger of the exhaustion or shortage of the local food supply. Famines occur almost every year in some of the out of the way portions of the earth, such as China, India and some parts of Japan, and there is every reason to believe that a series of bad crops or a cattle plague in the new world would not only cause great suffering in the old, but would so far reduce the means of subsistence in the new as to cause virtual famines, of which as yet we have happily had no experience.

The moral of the situation is obvious. Because of the abundance of our food supply we have hitherto been not only well fed but actually prodigal, or even wasteful of our resources. At last, however, the unthinking multitude is reminded by the pinch of the universal high cost of living that it is no longer possible for everybody in America to have everything he wants. It has been well said that the trouble is not so much with the high cost of living as with the cost of high living, and this clever epigram certainly covers a multitude of sins. Extravagance probably plays an important part in the present unhappiness, and yet we have little reason to suppose that *in proportion to the population* there was not nearly, if not quite, as much extravagance twenty years ago as there is today.

The one conclusion to which students of food supply are driven is that no safe and wholesome food can be wasted. We dare no longer require that all food shall be of the first quality. It is easy but foolish to say, for example, that "there is only one kind of an egg and that is a good egg" making the implication that the grading of eggs is needless and that everybody should have only the best. We must in the future have different grades of food adapted to different purses. Only the rich will be able to afford the best, many must put up with a second quality, and some with grades decidedly inferior. We can, however, require that the food shall be safe and wholesome, but sometimes only that it can be made safe and wholesome by cooking or otherwise. We must, nevertheless, always insist upon decency in food supply, even if this requirement is not always imposed by strict sanitation. There should be no place, even among people hard pressed for subsistence, for food that is filthy or otherwise disgusting. Unless food is reasonably inviting rather than repulsive it loses no small part of its nutritive value, so that the line must always be drawn in such a way as not to disgust or offend. Outside of this requirement, however, we ought to save all food which is safe and wholesome or capable of being made so in any way, and especially by cooking.

To this end the grading of foods is all-important, and precisely as we have beef, mutton, veal and fish of various grades, qualities and prices, so likewise we must have eggs and fruits and all other foods of various qualities and prices. We must also change some of our ideas and customs to meet the new conditions. "Bob" veal, for example, which is now under the ban of most boards of health, is, so far as known, good and safe and wholesome food, which we can no longer afford to destroy. The use of preservatives must probably be considerably extended in the future, so that foods which now go to waste in remote and out-of-the-way places may be preserved and transported to points of need. Honest labeling will always be requisite and proper, and bob veal, oysters taken from uncertain sources but rendered safe by cooking, and fruits preserved with benzoate or otherwise, should always be plainly marked as to their origin, character and mode of preservation.

Meantime, we must encourage in every possible way intensive agriculture, conservation, and increased production. Cheap and abundant food is the corner stone of a prosperous and healthy people. With such food civilization may or may not reach high levels; but without it the best forms of civilization cannot long endure.

THE FUNCTION OF ORGANIZED INDUSTRIES IN THE CONTROL AND IMPROVEMENT OF FOOD SUPPLIES.

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Read before the General Sessions, American Public Health Association, Colorado Springs, September 9, 1913.

The basis of power of control lies in the necessities which call for its exercise. The needs of food supervision consist, as the Federal Supreme Court has frequently stated, in the avoidance of a menace to health and the prevention of fraud.

It is unfortunate that the terminology of the National and, therefore, of most other food statutes does not clearly define these issues. The terms adulterative and misbranding are indescriminately utilized in describing both objects. The selling of a food which is a menace to health also constitutes a fraud and may thus be denoted as misbranding, but the selling of one food for another, or of a low grade for a higher does not of necessity constitute a menace to health, unless the lower grades or the substituted food is so inferior in nutritive quality as to predicate an actual failure in the required nutrition of the consumer. Our modern diet is so ample and varied that in this country any mere misbranding of food scarcely constitutes as yet a real menace to public health.

All will agree that no food definitely known to constitute a direct menace to the health of consumers should be allowed to be sold.

All will agree that the production, transportation and sale of food which, because of their nature and of defects in our methods of living, may at times be or may become a menace to health, should be safeguarded by all possible scientifically sound and efficient methods of supervision consistent with a proper support of the nutrition of the public as a whole.

Likewise, all will agree to the desirability of having an efficient, uniformly operating and practical supervision of the branding or labeling of foods as to quantity.

Discord most frequently arises when those whose chief function is to supervise foods from the health standpoint attempt to differentiate between commercial types of foods or between grades of commercial excellence of the same. Here our general lack of knowledge of accurate or even average nutritive values of types of foods, to say nothing of our almost total ignorance of the minor differences in actual dietetic and nutritive values of the different grades of the same types demand that attempts at supervision proceed with the utmost caution in order that the supervision of the health aspects may not be seriously involved by the resulting controversies.

In our present ignorance of a proper scientific basis for the determination of well defined grades of foods, the protection of the public from fraud, merely requires that claims made directly or indirectly for special quality for a food, should be capable of substantiation or the parties responsible for the claims put forth should be held to an accounting.

In the writer's opinion official supervision of foods properly includes the aspects of a menace to health probable or possible, and misbranding as to quantity and label truthfulness. In this opinion and for the present, at least, limits of maximum and minimum quality and of intermediary grades of commercial excellence should be for non-official control or commercial consideration. There remains for the individual, but better still for the coöperative activities of all groups, official, commercial, social, advertising and especially for the group of scientific investigators and instructors, the vast fields first of the further increase of our scientific knowledge of the best methods of production and the distribution of foods, secondly, the investigation and determination of actual and relative nutrative values of foods, and, thirdly, the universal dissemination of this added knowledge for the public instruction and benefit.

Turning now to the topic assigned to me, the function of organized industries, it becomes at once obvious that through actual ownership the industries have all the powers necessary for the conduct of their own supervision. If they had the knowledge, the means and the desire there would be no need of official, gratuitous or publicity supervision.

First, it must be admitted that the knowledge is to a considerable extent lacking. The determination of the causes of menace to health by foods must first be noted by scientists working in the fields of medicine and hygiene, who are usually officials or hold teaching positions. The development of remedial measures is, at least in part, one of these functions, although here by far the best results are to be obtained by a close cooperation by them with the practical men of the industry.

The excellent results obtained by Dr. M. E. Pennington in the study of the problem of cold storage through the most intensive coöperation with practical men of the industry is demonstrative of the efficiency of cooperation. America was flooded with the notion that prolonged cold storage of food created a menace to health. The work of Dr. Pennington, and a few other official and non-official scientists and investigators working in cöoperation with the practical operators of the industry, was instituted and the problem soon appeared to be one of economics and correct labeling or commercial grading. Cold storage as an important independent health problem has disappeared.

The history of the pasteurization of milk will furnish another appropriate illustration. Milk supplies were definitely shown by medical hygienists to be the means of distributing infectious diseases. Attempts were made by officials to prevent the same by an ever increasing rigid, sanitary and bacteriological supervision of such supplies. Still, outbreaks of some of these diseases occurred and were shown to be due to infected milk even when at the time milk had been produced under competent supervision. Market milk was shown to contain tubercle bacilli in a varying but large percentage of the samples examined. The rigid application of the tuberculin test and the destruction of reacting animals threatened to destroy the very sources of the milk supplies for the large mass of consuming public. A practical remedy for quick application was imperatively demanded. The medical suggestion that the milk be heated to the bacteria killing point raised a storm of protest within its own professional circles. Heated milk was claimed to be deterimental to full infant nutrition. A form of pasteurization was tried experimentally under medical supervision and then taken up by certain commercial concerns, but the controversy continued. The medical profession was practically ignorant of the real nutritive effect of such milk and the commercial pasteurization was more frequently conducted with the object of improving the keeping quality of the milk than the rendering it safe. Finally scientists with medical and official training working in close coöperation with those operating large milk plants demonstrated a more efficient system of pasteurization, including so-called holding devices, which could be relied upon to effectively destroy the infectious possibilities of milk so treated. This properly pasteurized milk was used in a sufficient number of infant milk stations, under the direction of official, voluntary and commercially paid medical supervisors to demonstrate quite conclusively that the medical fears of a detrimental effect from pasteurization were unfounded.

Thus, through practical and actual coöperation between scientists and the practical men of the milk industry, has a reasonably satisfactory remedy been obtained for the prevention of menace to health through milk. More than ever, however, will it be necessary for the coöperation to continue in the efforts made to bring about the universal adoption of the remedy, for there exists the old more or less inefficient systems to be supplanted and many scientifically untested new ones to be investigated and still much of the old prejudice against heated milk is to be uprooted.

Nothing but harmonious coöperation will bring about a speedy introduction of the much needed preventive measure. It would be unfortunate if the issue were clouded by attempts to bring into prominence along with pasteurization, problems which relate almost exclusively to the commercial grading of the various types of milks.

The combined coöperative effort of officialdom and the milk industry will have all it can comfortably attend to in the near future, in the efficient institution and the subsequent supervision and control of proper pasteurization of public milk supplies.

Knowledge of the menace to health problems, therefore, must come from those with the requisite scientific training and official experience, but is best applied when undertaken in coöperation with those having industrial experience.

The dissemination of this knowledge is a field which has no limits, but becomes the function and duty of all having possession of the facts.

When we come to consider the other proper function of official supervision, *i.e.*, truthfulness in quantitative labeling of foods, the knowledge of the complicating factors must come from the industries. Coöperation with them in determining the basis for official action is absolutely essential. Here the problems are easier if the industries are organized and act as units. In fact the officials in offering coöperation would, in any effort, be amply warranted in demanding a reasonably united and organized industry with which to deal, for reasons of greater economy of time and efficiency of results.

Coming to the field of discord, where questions of commercial grading and quantitative labeling are brought up for attempted solution, we find the situation complicated by a wide sphere of influence wielded by the public at large.

The food industries cannot be conducted for any great length of time on any particular basis, unless the basis has the free and hearty support of the consumer.

Those with much experience in official public health work, know only too well the general public apathy towards matters of even vital health importance, while demanding or paying promptly and even exhorbitant prices for mere conveniences and esthetics. The public are apt to demand only the kinds of efficiency which they themselves are capable of discerning. In foods the esthetic senses largely control retail buying. Even when organized industries create and use standards for their own commercial transactions, as is the case in the handling of the important kinds of grains, butter, eggs, etc., the public are ignorant of such standards and would not make use of them if they did have knowledge of them.

The public usually demands the best and they get usually what the retailer believes will satisfy them out of what he has in stock. Efficiently managed food industries long ago learned the value of educating the public to the purchase of certain brands of goods through advertising.

Mr. Waldo has, doubtless, informed you and has demonstrated conclusively that truthful advertising is the most expensive of all middlemen, but likewise the most efficient. He has, doubtless, convinced you that the efficiency, in the long run, depends to a large extent upon the truthfulness of the claims made. However, those who pass judgment upon the veracity of statements advertised, must be competent judges and must have the means of verification of facts. They can hardly do more than point out the problems not yet solved and suggest appropriate methods for their investigation. It is quite unlikely that the organized controllers of advertising will attempt to grade or classify foods on any scientific basis.

One thing is certainly true, whoever, whether he be official, publicist or industrialist, hazards the undertaking of the solution of this problem, and attempts to create standards for grades of commercial excellence in foods, must be fully prepared to substantiate the comparative commercial values represented by the grades established and also to demonstrate his fitness and ability to effectively and continuously conduct a proper supervision and control of such grading.

So far, few have more than expressed the desire to undertake the task. American health or food officials have but rarely gone beyond demanding that the labels shall tell the truth. Their efforts are now being more than supplemented by the commercial demands of those controlling large fields of advertising, that not only the labels, but all other printed statements or advertisements shall likewise tell the truth.

When all producers and purveyors of foods are obliged to confine their statements to what little real truth is available about the merits of foods, then anyone, who hopes for large commercial success of them and who does not have a corner on some food of already known and conspicuous merit, must be zealous in the discovery of more truth.

Right here there develops an appropriate and fruitful field for the activities for organized industries and for individuals in commercial food work. The farmers of the country, through their organizations, would do well to more directly and vigorously encourage the work of ——— and his associates at Wisconsin in their efforts to determine the real food values of certain of the constituents of our common grains. They should see to it that large grants are made for the support of such fundamental work as is being done by Mendel and Osborne at New Haven on similar problems in human nutrition. They should see to it that the Departments of Agriculture of the Federal and state governments were amply supported in their Food Research Bureaus. I mean researches on foods for man, not for animals alone.

The producers of dairy products of the country should see to it that more generous provision be made for the support of the work now being instituted by the members of the Official Dairy Instructors Association concerning the truths about milk.

The work on dairy products, such as butter and cheese, of a host of investigators in agricultural colleges and experiment stations should be greatly extended and include studies of the relative nutritive efficiencies of such products and varying grades or types of the same as human food.

Some organized industries have made a beginning in these directions. The National Canners Association, having supported efforts towards the elimination of fundamental difficulties in their operations, have now their own laboratories for the continuance of this excellent work and yet this should be supplemented by well controlled and effective studies on the actual nutritive values of their wares. When the results of such are available, how much more novel and effective can be the statements on labels and in advertisements? How much more interested will the public be in canned goods?

The cold storage interests have also encouraged and aided preliminary investigations of the comparative biological conditions in stored and unstored meat, fowl, eggs and of fish, but here again the work stops far short of what might be done towards a thorough convincing of the public of the real nutritive values of these great supplies of conserved foods.

The industries producing or distributing fresh meats, fish, shell-fish, fruits and dried fruits might most advantageously support similar investigations.

When we come to consider the industries responsible for the various foods sold under distinctive names and the luxuries, we need have little imagination to discern the thin character of the ice upon which they tread in their failure to be in a position to demonstrate the real nutritive values and other qualities of their foods.

With further increases in the already high cost of living, which will surely develop in proportion as the existing supplies of food are not scientifically and economically used, will come the demand for more and more facts concerning the real food values. No longer will the public be able to safely trust to esthetics in their choice of a dietary.

One feels constrained to shout loudly: Wake up, food industries, or the public will come to regret that no master minds organized you into trusts in order that your scientific problems might have been the more quickly solved and the public more promptly benefited thereby, or they will turn from you to their official servants and demand that they solve these problems for you. Nor will the officials then hesitate, even though they have not the practical familiarity with the detailed problems of your work, which would permit them to do the work as soundly and as thoroughly or as rapidly as you could do it.

The problems of a menace to health in foods were not primarily yours to solve, but the problems of grading on the basis of real values, the majority of which are more commercial in character than hygienic and are best solved by you and are, therefore, your function. Your neglect of this duty will but aggravate your difficulties later if it does not bring about your loss of real control of your business.

PUBLIC HEALTH ASPECTS OF THE CANDY INDUSTRY.

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Read by title before the General Sessions, American Public Health Association, Colorado Springs, September 9, 1913.

The rapid growth of certain industries, once unimportant, may well claim a certain amount of attention from sanitarians. Among these may be mentioned the candy or confectionery industry which in ten years has nearly doubled and in twenty years has developed from an almost insignificant position into one ranking easily in the first score in the value of the output and number of hands employed.

In Massachusetts, for example, confectionery ranks fifteenth among the industries of the state in the value of the product and there are employed in the candy factories in this state alone over six thousand persons. Thus the industry has developed not merely into a permanent and important one, but one liable to still further marked increase, for while candies must still be regarded to a great extent as luxuries, their consumption is constantly increasing among all classes of people. Because of its importance it is apparent, therefore, that the industry should really be grouped among the food industries.

As witn other commodities a great range of products may be obtained, varying from the very expensive and attractive in appearance to the very cheap and unattractive; from the high-class goods produced under good sanitary conditions to those which have little to recommend them either from the standpoint of quality or cleanliness in production and handling.

This great development in the scope of the business has been made possible partly because of the study which has been given to the manufacturing, but particularly because the scope of raw materials entering into the composition of these candies has been greatly increased. Thus the use of glucose, dried and evaporated milk, eggs, albumen, gelatin, etc., have made it possible to secure the great variety of products which we have at our disposal, and it may be emphasized that their use is absolutely unobjectionable so long as they are pure, clean and wholesome.

The importance of the industry from the standpoint of *public health* is, however, quite as noteworthy as its commercial importance. Here is an industry in which the product passes directly and sometimes quickly from the hands of the worker in the factory to the mouth of the consumer. Does not public welfare demand that the greatest care should be taken that all *substances* used in the manufacture of these products should be free from objection from the hygienic standpoint, that the *processes* should be carried out under sanitary conditions and with every attempt to prevent contamination, and that the *employees* should be under such strict supervision that there can be no possibility of infection by undesirable bacteria of these materials which go directly without cooking into the mouths of the consumers?

Of the usefulness of good candies there can be no question. Despite the early prevailing opinion that all candies were unwholesome, cause digestive disturbances, and were primary causes in the decay of the teeth, it is now recognized that good candies are high in food value, entirely wholesome if used in moderation, are no more predisposing causes of decay of teeth than other carbohydrate foods, and supply to the body *energy* in large amounts and in quickly available form. In other words, here is a *special food* which we may still regard as a semi-luxury but which, none the less, does bring to the consumer a marked amount of available energy as well as the pleasure derived from its consumption. In fact the craving for sweets which is sometimes manifested not only in children but also in adults should be regarded as a perfectly normal demand of the body for a certain class of carbohydrate foods and not an unhealthy appetite, and it has been suggested that when this craving is satisfied, others, as for example for alcohol, disappear or are greatly lessened. Assuming, therefore, that candies are to be regarded as special types of foods, even if not absolutely essential types, the position should be taken that they, like all other manufactured foods, should be subjected to such processes of inspection and treatment as will *guarantee the quality of the raw materials, safeguard the hygienic or sanitary character and maintain the high food value conditions of the product.*

Although materials containing deleterious substances have already been to a great extent eliminated from the manufacture of candies by the reputable producer, it is still possible that extremely minute amounts of substances sometimes regarded as objectionable may gain entrance with the use of certain raw materials. In my opinion, the dangers from this source, however, are now less than formerly, and practically may be reduced to a negligible quantity by a careful study and supervision of the raw materials in which these compounds may be found. I may mention here particularly the salts of arsenic, zinc and lead, sulphur dioxide, and certain preservatives such as formaldehyde. There is no reason why this last substance should be ever employed in any food material and its finding in any ingredient entering into the manufacture of candies should instantly banish that substance from the list of materials used. The same applies in general to the metallic salts, however, here the case is less clear, especially as these may occur in extremely small amounts, even in products prepared under scrupulous conditions. So far as the bacteria are concerned, however, the average manufacturer cannot safeguard himself to the same degree, and it is only by repeated examination and by constant watchfulness that the germ content of his finished products in many instances may be kept down to the minimum. This is particularly true of those products made from a variety of materials and in which there is very little cooking of the ingredients in the process of manufacture. This is doubly important, for the bacteria and other organisms may not only be of sanitary significance but may also involve severe commercial loss. Obviously, sugar is the most important substance entering into the composition of candies. The preservative nature of this substance in large quantities is well known, and it is also a fact that refined sugar itself is practically free from living germs. While, therefore, we may regard the main ingredient as being free from deleterious bacteria and perhaps as being capable of checking the growths of organisms which may be introduced from other sources, it is impossible to depend entirely upon this substance to bring about sterility because it lacks real germicidal power and it, therefore, seems to be necessary that the other materials used should be constantly subjected to bacteriological examination.

Furthermore, from the health standpoint, it seems to me out of the question not to have scientific supervision over the whole process, both with regard to the sanitary condition of the products and the personal hygiene of those employed. This advent of the bacteriologist into the industry is a new idea perhaps, but his scientific supervision should also lead to improvements in methods, extension of the scope of the industry, diminution of waste, and utilization of by-product so that there should be practically no loss anywhere in the process of manufacture.

In an attempt to carry out such scientific oversight as suggested above, the writer has tentatively adopted the following plan believing that all phases of the industry, so far as they affect the public health, may here be studied and kept under control:

GENERAL PLAN OF HYGIENIC CONTROL OF CANDY INDUSTRY.

1. The Plant or Factory:
    A. Construction, arrangement and cleanliness—floors, walls, ceilings and windows.
    B. Ventilation.
    C. Light.
    D. Freedom from dust.
    E. Cleanliness of machines.
    F. Sanitary arrangements.
2. Study of Raw Materials:
    A. Examination as to suitability for use.
    B. Examination for harmful substances.
    C. Examination for bacteria.

3. Study of Operations:

Under this general head should be included the progressive study of the processes employed in the manufacture of different kinds of candies, with a view to finding out whether they are subjected to conditions which in any way bring about deterioration, loss of food value, infection from handling, etc. Obviously, here is a field for careful examination of the *principle* underlying each process and an investigation to determine if the working out of the principle is most efficiently done.

4. Hygienic Supervision of Operatives, or Welfare Work.

Here should be carefully conducted studies of the physical well-being of the operatives, their attention to personal cleanliness, their freedom from infections of all sorts, and their suitability for the particular work they have to do.

To consider now more in detail the various investigations, which may be grouped about each one of these headings, may be of some interest. Under the first heading, dealing with the plant itself we have, as already indicated by the general plan, a number of subdivisions each one of which may supply a variety of minor investigations. In general, *inspection* will determine whether cleanliness pervades the whole plant as indicated by the appearance of stairways and passages, the cleanness of windows, the cleanness of painted surfaces, freedom from cobwebs, dust, flyspecks, etc., and these will give in general a clue to the degree of care which underlies all operations. When it comes to the examination of machines, however, a mere inspection is *not* sufficient, for frequently a machine may *appear* to be clean when as a matter of fact it is far from it, and this is not always the result of carelessness on the part of the operatives or lack of supervision on the part of the foremen or superintendents. The writer is convinced that not infrequently bacteriological troubles in food industries have their origin in infections due to machines which have not been thoroughly cleaned, but which *appear* entirely satisfactory when examined merely with the eye rather than submitted to the culture test. It is my belief, therefore, that machines which are subject to handling or through which moist raw materials containing bacteria pass in large amounts should be examined from time to time with a view to discovering if any crevices, joints or hidden pockets serve as breeding places for bacteria and thus infect by contributing large numbers of bacteria to the material as it passes through.

The examination of the ventilation and light supply may also be made in general comparatively easily. Determination of the free carbon dioxide (the old method of testing ventilation) can be conducted with comparative ease if desired, and the humidity observed with great accuracy. In the food industries, however, it would seem to be of special and greater importance to note the *source* of the air which is blown into the buildings and to examine that air from the *bacteriological* rather than from the chemical standpoint. Dangerous air is that which contains organisms of undesirable types rather than that which is high in carbon dioxide or humidity, although the latter factors unquestionably contribute more to the temporary discomfort of those who have to breathe and work in artificially ventilated rooms than the presence of bacteria, even of dangerous types. Examination of the air supply and the examination of dust from any source may, therefore, in my opinion be carried out with good effect, and if germs in more than very small numbers are found to be introduced from these sources, the defect should be at once corrected.

The examination as to sanitary arrangements, toilets, etc., should be given a much larger place than is ordinarily done. These should be inspected as to cleanliness, ventilation and adequacy, and at the same time it is imperative that they should also be located properly and so separated from workrooms that infection from them is absolutely impossible. There should be posted in conspicuous places plain statements bearing upon the necessity for personal cleanliness in their use, and rules requiring the thorough washing of the hands with soap and water after visiting them. No false sense of propriety should permit anyone dealing with the handling of food substances to leave any doubt in the minds of operatives on this score. Our knowledge of Typhoid Mary and other bacillus carriers supplies ample proof of the necessity for plain statements and positive action in this matter. Adequate facilities for washing and a plentiful supply of good soap and of clean towels should be insisted upon, as the towel which has been used for a large number of individuals no longer gives any protection but is, on the other hand, a source of danger to each of the users and also to the industry involved. Disinfectants may be supplied, but in general a good soap will serve effectively in this direction. A very simple statement of the relation of *intestinal organisms* to fermentation and decay may be made to advantage with the rule requiring proper washing of the hands, and in the case of intelligent operatives at least, this will undoubtedly supply in some instances a reason for hand washing which may have been entirely overlooked previously.

(2) *Study of Raw Materials.* The raw materials employed in the candy industry are, as is well known, very numerous and varied. Some may be absolutely pure and sterile, while others, even if not adulterated, may contain large numbers of bacteria, often of undesirable types. It is, therefore, well worth while for the manufacturer who is anxious to produce the finest product to employ only such materials as are free from these deleterious or objectionable organisms. Aside from the bacteriological examinations, it is most important to be certain that they may not contain harmful ingredients. Really there is no reason why any food substance should contain excessive amounts of arsenic, lead and zinc any more than they should contain large numbers of undesirable types of bacteria. It is important, how-

ever, to bear in mind the probability that certain of the raw materials used in the confectionery industry, like many other food substances, undoubtedly do contain arsenic, iron, zinc or lead, especially the first, in extremely small amounts and that it is practically impossible to secure them quite free from these substances. The same general statement may likewise apply to sulphur dioxide which, in certain cities, has been found in small amounts in certain products when the ingredients entering these products are known to have been free from it. The explanation lies in the fact that this gas is produced in considerable amounts in combustion, and the atmosphere may as a result contain it in quantity large enough to give it up to absorptive materials. Examination of the purest products obtainable may very well then be conducted with a view to discovering whether these elements are present and, if so, if they are normal ingredients organically bound up in the molecules of the substance in question, or whether they are really to be classed as impurities or adulterants. Thus it is possible to establish a sort of base line as a means of comparing the products ordinarily obtained with what may be called the *normal* material. As proper examinations of this sort I should suggest examination of starch for bacteria; glucose for micro-organisms of fermentation and for arsenic; chocolate for arsenic and other metals and for bacteria; various gums for bacteria; gelatin for arsenic and zinc, and for bacteria; and similar examinations in the case of egg products and milk products. In case pastes, jellies and similar compounds are employed, these may be examined for bacteria, for the presence of mineral substances and preservatives. No product which is found to contain excessive numbers of bacteria or which contains undesirable types of bacteria in even small numbers should be regarded as satisfactory material to employ in the confectionery product. As previously hinted, sugar has been omitted from the list of ingredients to be examined, and yet this is the most important of all from the standpoint of quantity. The reason for this omission is essentially this—that refined sugar as purchased is ordinarily nearly germ-free, the mother-liquors which contained most of the organisms originally present having been thoroughly removed during and following the process of crystallization. The same reasoning applies to products which are made by cooking or to which much heat is applied in the manufacture.

There is one other point in connection with the examination of raw materials which I believe to be worth considering. It is, of course, conceivable that substances may have undergone certain fermentations or decompositions so that they are no longer suitable for food. Generally this would be manifested by the enormous numbers of bacteria contained. If, however, these have been destroyed in any way, direct examination for the end-products of putrefactive or fermentative change may be applied, and as a result of all the methods suggested the character of raw materials can be kept under very close supervision. Accurate knowledge coupled with common sense in the interpretation of results not only gives the manufacturer confidence as to his methods but also supplies him the data for refuting the sensational attacks and false statements of charlatans who, using "pure food" as a shibboleth, would prey upon him and injure him in the estimation of the consuming public.

(3) *Study of Operations.* As previously indicated, here should be included the progressive study of the principles and details of the processes employed in manufacture. Most specifically, it should be the function of the scientist to discover whether the proper chemical or physical change is going on or if the conditions favor chemical deterioration of any sort, bacterial development, loss of properties which substances should possess, or infection from handling. Furthermore, on the side of efficiency, the actual character of each process should be studied with a view to bringing about the desired result in the shortest time, with the smallest amount of waste, and the minimum degree of handling. I believe it to be a desirable thing to replace hand operations by machine work whenever this can be done without introducing a greater danger from the machine than is corrected by its use. In this connection, the operator should be studied as a part of the machine, for the motions or habits of the operator may be essentially as important as the proper running of the lifeless mechanism. Most strenuous regulations should be made against the uncleanly habits by which germs could be transferred from the mouth of an employee to the candies which he handles. Dirty finger-nails, spitting or the wetting of fingers in the mouth to pick up wrappers, or for any other purpose, should be absolutely prohibited since by these means it might easily be possible for the germs of diphtheria, typhoid, or tuberculosis to be carried from one person to another who happens to eat the particular pieces of candy which are infected in this way with the germs. Even without this direct transfer it might be possible for bacteria to pass from operative to product through the uncleanly habit of spitting, and there should be iron-clad rules against spitting upon the floors or, in fact, any spitting in the workrooms. The mild destructive effect due to sunlight which we find in the streets is generally entirely lacking, and living germs of more or less virulence may easily be carried by dust particles throughout the room and lodge upon either the materials entering into the composition of the candies or the candies themselves. In the factory in which I am now carrying out investigations it has for a long time been one of the cardinal sins for an operative to spit upon the floor or to use saliva on the fingers in picking up wrappers in place of the moisteners which are supplied for this purpose. Unnecessary fingering, anything on the part of the operative which could transfer germs from the mouth or fingers to the food materials being prepared, should be eliminated in so far as that is absolutely possible. As

other types of investigation along this line, it may be well to inquire whether the hand-dipping of chocolates involves any serious bacterial contamination, and is, therefore, objectionable, or whether the hand-wrapping of paper-covered goods is really a means of putting in bacteria or of excluding them.

(4) *Personal Hygiene of the Operatives, or Welfare Work.* In the plant of the company with which the writer is attempting to work out some of these special problems, some attention has already been given to a number of the points which have been mentioned above. The welfare work, has, however, been established on a high plane for a considerable period and not merely the efficiency of the workman but to a certain extent also his enjoyment and personal well-being have been considered. This makes it possible to do distinctly more from the scientific standpoint than could otherwise be the case. Thus, it is the regulation of this company to require shorter days of women than of men. Well equipped rest rooms are provided for both men and women as well as clean, airy rooms where operatives may eat their luncheons either brought from home or purchased at cost price on the premises. Free coffee of excellent quality is supplied to all operatives at the luncheon period which is of an half-hour duration. These lunch rooms are cleaned twice daily and are thoroughly sanitary. Ventilated lockers are supplied for the clothing of the operatives and every possible facility for cleanliness and comfort is available. A resident nurse attends to the minor ills which may appear from time to time and, out of a working force of about 1,000, she sometimes has as many as sixty-five visits in a day, these varying, of course, from slight discomfort to serious illnesses, accident cases, etc. Furthermore, a physician is in attendance on three days of each week and he may see as many as two hundred cases in the course of a month. A very careful record is kept by the nurse of every visit from an operative in order that there may be a follow-up process wherever it is necessary, and in this way a high percentage of effectiveness is maintained in the whole working force, as well as a guarantee of freedom from objectionable skin diseases or other ailments. Professional secrecy is maintained, no officer of the company knowing the character of the individual cases or having access to the reports of the nurse and physician. A study of the weekly reports submitted by the resident nurse to this company shows how thoroughly this inspection work is carried out and with what care people suffering with affections which might adversely influence the quality of the product are excluded from the factory. For example, I find in the monthly report for March a record of 519 office calls of all kinds. Among these there were detected twenty-three cases of tonsilitis. Here is a disease which has never until recently been a reportable disease so far as the board of health is concerned but we know it to be one in which serious

infection may take place or may pass from person to person or from a person sick with the disease to materials which he may be handling. In order to be absolutely safe, therefore throat infections of all kinds in which pusr forming bacteria are concerned and, of course, all types of tuberculosis and venereal disease, in fact, any case involving *an infection*, should be placed under the most careful supervision whether it be a medical or a surgical case.

A feature of the medical inspection which is, in my opinion, of great importance is the inspection of new employees which is carried out by the visiting physician and by the nurse. Any candidate for a position in which the employee would in any way come in contact with the candy itself must pass a satisfactory physical and medical examination, or will be excluded from the work. In addition to this inspection there is also carried out, from time to time, inspection of the older employees in order to be sure that they have not since an earlier examination contracted any infectious disease which could be prejudicial to the quality of the product upon which they are working. A sample weekly report of the nurse is here given since it may be of some interest to manufacturers and others who have similar welfare work either installed or projected:

WEEKLY REPORT FOR WEEK ENDING MAY 24, 1913.

Medical Cases.		*Surgical Cases.*		*Office calls,*	159
Tonsilit's,	5	Minor accidents,	5	Attending doctor's clinic	37
Influenza,	2	Minor cuts,	7	Inspected by doctor	13
Syncope,	1	Minor operations,	2	Inspected by nurse	24
Laryngitis,	1	Foreign body in eye,	3	Excluded tuberculosis,	1
Sick headache,	16	Scratches,	2	Cases under observation	6
Abdominal pains,	4	Warts removed,	2	Surgical dressings,	56
Toothache,	5	Heel blisters,	1	Ex. Eye and Ear Infirmary,	1
Cramps,	7	Slivers removed,	2	Sent to Dental Infirmary,	0
Eczema,	1	Abscess in mouth,	2		—
Constipation,	2	Infected vaccination,	1		
Ptomaine poisoning,	1	Boils,	3		
Lame wrist,	3	Septic finger,	1		
Lame ankle,	1		—		
	—		31		
	49				

The men and women in charge of departments and sub-departments are instructed to note carefully all cases of apparent inability to carry on satisfactorily the work in hand and to send such operatives to the nurse for examination. Finally, along this same general line, the nurse gives simple but thoroughly scientific lectures to the women operatives, dealing with those matters of personal hygiene, deportment and general sanitation which may be of most importance for them personally and for the proper carrying out of the operations with which they are entrusted. Similarly careful supervision is maintained over the male operatives and the results which have been obtained are most gratifying. The value of organization is recognized and emphasized through the establishment of a Mutual Benefit Association. The officials of the company have taken a deep interest and the reaction upon the conduct of the work for the company is apparent.

From what I have said, it might appear that the welfare work undertaken is entirely based upon philanthropic motives. As a matter of fact this is not the case, and, in my opinion, would not be as successful as it now is if the employees were led to believe that the whole thing was a matter of charity. It should, on the other hand, be regarded, and is properly regarded, I believe, purely as a matter of efficiency. It is obvious that the effectiveness of a worker is directly dependent upon his well-being, that one who is in perfect health and full vigor will do more in a given time and will work more continuously than one who is run down, tired out or ill. The human body is a machine after all, and the wise employer appreciates this fact, and is sure that the well cared for machine, whether of muscle or of steel, is the one from which the greatest output may be expected. Welfare work, therefore, has its monetary side as well as its philanthropic side, and were it not for the former, I question sometimes whether it would be entirely successful. So long as both employee and employer are benefited there is pretty sure to be *coöperation* and this is the key to success; when the advantage is all on one side other results are likely to take place.

A still further extension of this work is possible by a campaign of education. Simple talks on cleanliness, germs and their relation to disease; germs and their relation to putrefaction and fermentation and to the ease by which germs may be carried from the alimentary tract of one person to the alimentary tract of another should be effective agents in improving the attitude of the operative toward the whole problem of sanitary production, because they have a personal relation to him and his own welfare.

I wish to reiterate that I wished to convey in the beginning, namely—that in this important branch of the food industry every attempt should be made to place the whole method of manufacture and handling on the highest plane with respect to cleanliness, wholesomeness and the general principles of sanitation and decency.

TRANSPORTATION OF FOOD PRODUCTS: A PRESSING HEALTH PROBLEM.

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Read before the General Sessions, American Public Health Association, Colorado Springs, September 9, 1913.

It will be recalled that at last year's meeting of the association a symposium on cold storage was presented, which dealt with the problem of the conservation of food products. In view of the present high cost of living, remembering that ordinary urban populations are made up of at least 80 per cent. of what may be termed day wage earners, and that from 40 per cent. to 50 per cent. of their total expenditure is upon food necessary for their subsistence, it must be plain that too much attention cannot be given to the several factors involved in the cost of food, this being the one dominating influence upon the effectiveness of the labor of the worker and of his maintenance at an average standard of health. Associated with this problem is, of course, the housing question; but after all, like all other animals, man primarily concerns himself with obtaining the ordinary means of physical subsistence.

Economists seriously discuss the question of whether or not food supplies the world over are relatively decreasing as compared with the increasing population of the earth; but so far we find that the capacity to produce foodstuffs is, owing to improved methods, about keeping pace with increasing population, any defects locally being due to lack of distribution and excessive cost. While this statement is probably true we have abundant facts before us showing that in certain products as "meats" the supplies on the North American continent have in recent years decreased relatively if not absolutely, and their export from the United States and Canada has practically ceased. To illustrate this we learn from the United States census for 1910 and that of Canada for 1911, as well as from reports from the Department of Agriculture, the following facts:

United States.

Total cattle on farms 1907	71,300,000
“ “ “ “ 1912	77,000,000
“ swine “ “ 1909	54,150,000
“ “ “ “ 1912	61,172,000

CANADA.

Total cattle on farms 1911	6,699,000
" " " " 1912	6,595,000
" swine " " 1911	3,332,000
" " " " 1912	3,153,000

PROVINCE OF ONTARIO.

Total cattle on farms 1911	2,503,000
" " " " 1912	2,413,000

Surely then, in view of the above figures, the conservation of the food produced, both from the standpoint of its quality and of its cost, demands the application of the most scientific methods available both in production and in transportation to prevent organic changes in these perishable products, and which alone can be brought about by the application of "cold" or the method of asepticism. The development of these two methods as seen in the great cold storage houses and in the canning industries has proved so great as to have resulted in the accumulation of capital in a few hands to such an extent as to have created a practical monopoly, controlling in the case of meat, it is said, 90 per cent. of the total animals killed in the United States; while in Canada the United Canneries are said to control 95 per cent. of the supplies purchased by the wholesale houses. Associated with this centralization of production there has come to be a development of special cut rates in the transporting of the products of these great companies by both railways and steamship companies. To such an extent has this gone, indeed, that the interference of both state and Federal governments in the United States became necessary, while similar problems are today being investigated by the Railway Commission of Canada.

The extent to which such discrimination in rates has gone on does not, however, enter into our problem beyond the point of determining first, whether the rates charged at present are excessive to the extent of seriously affecting prices, and second, whether or not the special advantages possessed by the handlers of food products in wholesale amounts and carload lots do seriously injure on the one hand producers to the extent of causing a lessened output of products, and on the other, hurt consumers through the creation of artificial "scarcities" in local supplies. There can be no problem then of more interest to everyone and yet involving more difficulties in its solution than that of the relative costs and the values which ought to attach to each of the three items of *production*, of *transportation*, and of *sale*, each one of which is an integral factor in determining the cost of food.

The investigations which already have been carried on by various government commissions have brought to light many anomalies, some of which were so obvious as to require only to be pointed out in order for a remedy to be applied; yet I find in examining freight tariffs, whether they are of railways or of steamships, that such anomalies are still abundantly present and which, to the ordinary layman, seem inexplicable. Railway rates on this continent are very similar, whether north or south of the 49th parallel, and the method of levying seems similar to that established by the transportation companies, whether railway or steamship, of Great Britain. Everywhere is witnessed the transport of raw grain or cereals at a rate approximately one half of that charged upon other articles of food, as potatoes, cheese, butter, etc. Indeed, in a case I was recently personally interested in the rate per 100 pounds for seed peas and corn was 15 cents, as compared with 35 cents per 100 on potatoes whose selling value was actually less than half that of the cereals. Another and even more remarkable difference is the disproportionate rate for a car lot as compared with a part car or of mixed freight. Equally anomalous is the enormous difference in favor of car lots in what is called "the long haul" and in the great discriminations against local freights. Similar anomalies are found in the matter of express charges on different kinds of supplies and in special tariffs made in favor of some one district which ships largely some one or more particular products. Equally remarkable is the effect of transportation methods associated with wholesale consignments, in maintaining local prices in a district for products produced there, at a price as high, or even higher, than the same products can be bought in a market many miles away. Now it may be that the opinions of members of an association of this character are of little value from an expert business man's standpoint on so complicated a matter as freight rates; but, nevertheless, it is quite within the range of our capacity and certainly becomes our duty to enquire whether or not existing methods, by affecting seriously the quantity and varieties of the various foods which, owing to the price either may not be transported at all to certain districts or if forwarded then only at such cost as to make their sale practically prohibitive, are not resulting in definite and serious injury to the public health. Take, for instance, the supply of fruits to the towns and settlements on the wide expanse of prairies of the north western states and the provinces of Canada where in practice little or no fruit is grown. California fruits, I am informed, can often be bought at less prices in London or Liverpool than in New York, and much cheaper in New York than in places much nearer the source of production. When, as I learned yesterday, a dozen pears on the Ottawa market cost 60 cents and when the vaudeville girl in New York asked the conundrum last winter, "How much do you suppose I had to pay for an apple in a Broadway shop when I asked for 10 cents worth?" and no solution coming, she replied, "They told me they never cut one apple," it is apparent that no limits based upon actual values can be set to charges that are sometimes made for food supplies. Of course, we are aware of some of the causes of these anomalies as when the great companies which control these products place them most conveniently in the great markets of the world in large quantities, where such can leave the problem of their subsequent distribution to commission men who have extended facilities for handling them. This, however, in no wise lessens the necessity for our considering these facts in their bearing upon the public health and of seeking some remedy for conditions so inimical thereto as the absence of fruits from the dietary of large populations living through the long winters of our northern climates, or the prohibitive prices in other centers except at times when there is a local glut in the market. Another part of our problem is the cost of local transportation and distribution after supplies have reached urban centers. To illustrate, last winter I bought 400 pounds of turkey which cost 65 cents for freight carriage by stage over some twenty miles, 35 cents for railway freight and 75 cents for suburban delivery some three miles. Or again, we can illustrate this difficulty by referring to the methods of the collection and distribution of milk supplies. I noticed in the last Chicago *Weekly Health Bulletin* that 85 per cent. of 1,811 cans of milk tested for temperature had given a temperature over 60° F., and an average over all of 64.6°. I further learn that all the great American cities are struggling with the problem of whether it is possible to require a temperature of 60° F. as a maximum and of whether 500,000 or 1,000,000 bacteria per cc. are permissible. Now, if in any food the most scientific methods possible are demanded it is in that of one so sensitive to organic changes as milk is, and yet, in the matter of transportation we find it at every stage still being handled too often in the crudest and most expensive manner. It is over twenty years since, in a series of experiments carried on under my direction, I found it readily possible to have milk at the farm dairy cooled and bottled and kept for days with not more than 2,000 bacteria per cc., and without any increase whatever after four days in its acid reaction when kept in the ordinary ice house. Further, this dairy was able with perfect success to deliver its milk in the city five miles away once daily without fear of its becoming sour.

Now, if it is so readily possible to obtain such results with this essential food in the country, it ought not after twenty years' development of methods to be difficult to have it transported rapidly and properly on trains and to be delivered at low temperatures in our cities, there to be again delivered under municipal regulations directly from one house after another on the same street, instead of its being hawked about by half a dozen milkmen going over the same street one after the other. If in such a suggestion we are told that we are interfering through state or municipal regulation with ordinary trade we may properly reply that we are doing nothing different from that by isolating persons for contagious diseases and by closing boarding-houses or hotels in the interest of the public without any regard whatever for the doctor's trade. It is equally clear that for the large cities the installation of milk trains with special insulated cars ought to make the cost of transportation cheaper than the old crude methods too generally in use.

But if we are again told that we are attempting to interfere with the economic principles of supply and demand or absolute liberty of labor, we may very well answer by enquiring whether or not the employment of great aggregations of capital to dominate the purchasing, manufacture and distribution of the food of the people has not violated much more than anything we may recommend this very principle of free labor. We know, too, that there are social and ethical elements which today enter very largely into this as other health problems and which are quite contrary to the operation of this abstract principle. Thus the most useful vocations, as farming, tend to become abandoned while the attraction toward occupations of the younger generation growing up is often followed wholly without any regard to the social utility of such. In fact we find the *laissez faire* principle of nineteenth century economists violated in practice at every turn and that society is now turning to enquire if, in its evolution, some more scientific methods are not demanded in the higher interest of humanity in a society of ever increasing complexity.

On the day of writing the above I found this item of news from the Canadian Trade Commissioner in England: "During the past few years charges have increased regularly each season for the carriage of goods between Canada and the Mother Country. Of late, however, the rise has been more rapid. For instance, flour from Canadian ports has advanced from 9.75 cents per 100 pounds in 1911, to 17.67 cents last year and grain from 6.97 to 13.92 cents. There have been similar increases on crockery and cotton goods. It is understood here that the British and Canadian governments are about to investigate the matter."

We are seeing agricultural commissioners being sent from the United States and Canada to investigate European agriculture with a view to obtaining information, which can be turned to practical use in the solution of problems on this continent and all are reporting that there is needed, (a) Reconstruction of soil fertility, (b) Coöperation in methods of producing and selling, and (c) Getting as in England, the food products cheaply to markets. Throughout England, with good roads, the motor truck is helping to solve the latter problem; but, with the exception of farming near great cities, it is apparent that the railway must remain the great medium for food transport on this continent. I recently asked a shrewd expert in our Federal Department of Agriculture how he would establish the proper ratio of values between *production*, *transportation* and *price?* He cynically remarked:

(1) Obtain the information as to how many middlemen have autos.

(2) Remember that the cost of transportation depends directly upon how well the railways have a man isolated so that they can raise the rate to the highest point possible, short of strangulation of the shipper.

(3) Don't forget, that the cost of production will depend on how many men are left over for farm labor after the protected manufacturers have all the men they want.

If then in practice we find the solution such as described we ask whether anything can meanwhile be done to minimize the evil effects of existing conditions. I am sure that some primary step is demanded, whereby not only will more food products be grown but also whereby more will be consumed on the farms. With the illustrations given of stationary or decreasing food supplies in Canada on the one side and of an urban population increase of 38 per cent. in the last census decade, or from 30,000,000 to 42,000,000 in the United States and of 62.5 per cent. or from 1,258,645 to 2,021,799 in the same period in Canada, it is idle to say that we can be content with present conditions when every abnormal price affects the health and happiness of millions of the people.

I expect to hear from every side the remark; Why if it is simply a question of a few millions of our population deurbanizing themselves and going back to the farm, why don't they do it? Land is cheap enough! Superficially the remark seems quite proper and logical; but I have practically never found one of these persons, who cry out frantically about the cost of living and who, nevertheless, make such remarks, willing himself to lead the way toward this solution of the problem. There can be no doubt but that such deurbanization must come and that it will come by a movement from above downward rather than from below upward, speaking in a social sense; but any such movement to be extended and permanent must have an underlying economic and social basis. Primarily it must be made to pay this future deurbanizing agriculturist and it is at this very point that the transportation problem enters. Could there be from the social standpoint any serious difficulty for the hundreds of communities who deurbanize themselves by going daily ten or fifty miles from New York to their homes, entering upon a scheme, preferably coöperative, whereby capital with business organization could combine to produce, prepare for markets and sell agricultural products to almost any imaginable extent? Surely the resources of such financial and scientific coöperation ought to be equal to finding means whereby the cost of transportation would be so adjusted that each person from the producer to the consumer would be adequately recompensed for his share in the process. Only a fortnight ago Earl Grey, late governor-general of Canada, making the opening address at Glasgow before the International Coöperative Congress, pointed to their achievements from the first Rochdale store in the early sixties to the present time when probably one third of the food sold in Britain is sold through these coöperative stores as coöperation between the producer and consumer—it being in the case of the stores the consumer becoming, in fact, the producer—as being the most effective way of limiting the aggregations of capital which come to form trusts.

It is remarkable how advanced many European countries are in the development of such principles and quite as remarkable how individualism has, up to the present, held supreme sway on this continent except in the easy coöperation through centralizing of capital by millionaires in cities, it may be, thousands of miles apart, for ends I shall not say predatory but which are essentially selfish. Up to the present it has been through the command of liquid assets that the capitalist has always been in the position to dominate any situation by utilizing the facilities ever at his command. Rapid communication, as the telegraph, telephone, the train, the steamer have all been his ready servants and producers of every kind his commission agents, the railways his too frequent allies and the public his too constant victims. I do not think, however, remembering the conditions, crude, raw and undeveloped which till recent years have prevailed on this continent, in the absence of some theory of political economy different from that of the *laissez faire* school, that results other than those which the people, especially of the United States, seem to have set themselves to correct and modify, could have been possible. Accumulated capital even in the matter of lessening the cost of production may be and is often of enormous public benefit. What is demanded everywhere is the going hand in hand of ethical enlightenment and scientific development if we are to approximate the solution of the people's food problem. It is the problem of the proper distribution of values—the same as is involved in the housing problem where the cost of land determines the value of every other item in the schedule. It is the question of distribution of labor, not by the blind process of increasing the cost through limiting the amount produced, but by diverting human energies to productive industries crying out for labor and assistance. But most of all it is the evolution of the "Social Conscience" which means nothing more than an increasing general intelligence and an approximation throughout society in the world today to a realization of a system of social economics so far never surpassed even in the dreams of our great transcendentalists, summed up in the Scriptural formula "Bear ye one another's burdens," and in "All things whatsoever ye would that men should do unto you, even so do ye also unto them, for this is the law and the prophets."

THE INFECTIOUS DISEASES OF 8,900 CHILDREN.

Preliminary Note.

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Read before the Section of Public Health Officials, American Public Health Association, September, 1913.

The method of collecting the data here presented is believed to be comparatively new in its application; and it is believed that it has never been applied so widely before.

The method originated from the observation made in field epidemiological work that the mother of the household was usually well posted on what had happened in her family, and was usually the only one who could give, or calculate, the dates of these happenings. Hence it was recognized that the mothers of the race hold, in the mass, the minute personal history of the individuals of the race in greater detail and in better chronological order than any other class; moreover, that this is especially true of the diseases their children have suffered.

During an investigation of poliomyelitis extending over several years in Minnesota, the histories of the patients were so collected as to show the infectious diseases each had had. This has been done from time immemorial perhaps, but the figures obtained were tabulated and indicated infection so wide-spread amongst the children as to be appalling. True we all know and have laughed over the apparent inevitableness of measles, whooping cough, scarlet fever, etc., amongst children, and we all know in a general way that sooner or later the whole population suffers from some one or more of these infections. But these studies, inaugurated in Minnesota as a side issue of the poliomyelitis investigation, gave such definite and irrefragible figures* as to make it appear worth while to determine the same facts in the same way in Canada; *i. e.*, from the mothers, through the schools.

The usual medically collected statistics on the cases of infectious diseases are vitiated by two well known, absolutely established facts: first, physicians do not report all the cases they see; second, and far more important, although its importance does not seem to have been taken in really as yet, physicians do not see a very large proportion of the total cases, and, therefore, even if the health officers' ideal of every physician reporting every case he sees were realized, our medically collected statistics would be still very far short of the truth—at least 50 per cent., probably 75 per cent. in error.

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* Much of the collecting and tabulating of the Minnesota data was done by or under Dr. A. J. Chesley, now Director: Division of Epidemiology, Minnesota State Board of Health.

Calculating cases from deaths is a good method, provided we know the deaths and the factors to be applied to them. Since we do not know the factors to be applied to them as a rule, it is absolutely worthless as a rule. We can only find the factors to be applied by dividing the cases by the deaths: we must know the cases in order to divide them; and if we know the cases there is no object in calculating them.

One of the by-products of this investigation is a complete demonstration that most of our fatality rates—*i. e.*, deaths to cases—are wrong and far too high.

Objections to the method usually take the following forms:

1st. That the mothers do not know the information asked, *i. e.*, what infections, and when, their children have suffered. A very little inquiry amongst any set of mothers will dispose of this objection at once.

2d. That the mothers would refuse the information asked. Table No. 1 indicates that the mothers in London, connected with the twenty-three schools concerned, responded for 74 per cent. of the school enrollment; in over one half the schools, the returns were 80 per cent. or over of the enrollment; and in only three schools did the returns fall below 70 per cent. of the enrollment; while in addition returns were made on nearly half as many more children, over and under school age.

3d. That the mothers would give frivolous or stupid answers. These returns showed frivolous or stupid answers in about 5 per cent. of the total; in 95 per cent. they were quite evidently straightforward, direct replies, consistent with themselves and with each other.

4th. That with the best will in the world, the mother's diagnosis would be fallacious. It is quite true that the average mother cannot recognize the infectious diseases with the swiftness and certainty of a trained expert, especially in the early stages of the attack. But this was not the task set the mothers. They were asked to record what their children had had, after the attacks had run their full course, generally years after; when opportunity for reflection and comparison with the neighbors' children had been afforded; and long after the diagnosis had been threshed out and settled. Remember also that the cases the physician does not see are often recognized by the laity, through comparisons with the cases he does see, as well as by consultation with the more experienced older mothers. Finally, these errors tend to correct themselves, for in large series of cases the diseases likely to be mistaken for each other are likely to be mistaken 50 per cent. one way, 50 per cent. the other.

This shows a total of 8,903 children returned, 1,778 under, 5,788 at, and 1,337 over school age (6–14). Of those over school age, 387 were attending the Collegiate Institute, and were of school age so far as the Collegiate Institute was concerned.

These returns represented twenty-three different schools. Owing to an

TABLE NO. 1—SHOWING NUMBER OF CHILDREN RETURNED.

Schools.	Returns by Age and Sex.			Returns to show School Age.			School enrollment at census time.	Percentage of enrollment returned.
	Total children.	Males.	Females.	Total under 6.	Total 6 to 14.	Total over 14.		
Public Schools:								
Aberdeen	816	363	453	299	437	80	512	85%
Alexandra	330	169	161	42	258	30	319	80%
Chesley Ave.	699	334	365	183	428	88	507	84%
Colborne St.	88	46	42	10	76	2	84	90%
Empress Ave.	469	240	229	70	339	60	397	85%
Grand Ave.	183	96	87	40	129	14	146	88%
King St.	94	50	44	17	71	6	96	74%
Lorne Ave.	816	423	393	185	522	109	612	85%
Princess Ave.	260	124	136	39	188	33	466	42%
Quebec St.	91	48	43	12	79	0	101	78%
Rectory St.	385	186	199	68	290	27	394	73%
Richmond St.	88	45	43	25	61	2	81	75%
Simcoe St.	685	327	358	138	446	101	553	80%
St. George's	1,026	511	515	242	664	120	743	89%
Talbot St.	561	293	268	105	380	76	450	80%
Victoria St.	574	305	269	104	419	51	537	78%
Wortley Rd.	494	251	243	139	287	68	335	85%
17 Schools	7,659	3,811	3,848	1,718	5,074	867	6,333	80%
Separate Schools:								
Sacred Heart	93	46	47	4	83	6	129	63%
St. Mary's and St. Martin's‡.	215	104	111	31	159	25	282	56%
St. Nicholas*	75	40	35	1	67	7	80	83%
St. Peter's	281	152	129	24	212	45	278	76%
5 Schools	664	342	322	60	521	83	769	67%
Collegiate Inst.	580	298	282	0	193†	387†	721	80%
Grand Total	8,903	4,451	4,452	1,778	5,788	1,337	7,823	74%

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* This school is now known as St. Michael's and is so designated in the report of the Catholic Board of Education.

† Both figures carrying the dagger must be combined to get the children of school age in the case of the Collegiate Institute.

‡ St. Mary's and St. Martin's are two different schools, in two different parts of the city. The cards were, however ,inextricably mixed and are reported together.

unfortunate mixing of the cards of two small schools (St. Mary's and St. Martin's), there are only twenty-two groups, each corresponding with one school, except one, which represents the two "mixed" schools.

These groups are presented in the tables 1, 2 and 4 to bring out the variations amongst them, as well as to point out the great uniformity also.

The total 8,903 children were practically exactly divided in sex, almost exactly half (4,451) being males, almost exactly half (4,452) being females.

TABLE NO. 2.—SHOWING COMPARATIVE RATES, MALE AND FEMALE.

	Males.	Females.	Males, total attacks.	Females, total attacks.	Males, attacks per head.	Females, attacks per head.	Female ratio (males 100).
Aberdeen	363	453	653	920	1.8	2.0	111
Alexandra	169	161	404	405	2.3	2.5	108
Chesley Ave.	334	365	730	863	2.1	2.3	109
Colborne St.	46	42	117	113	2.5	2.6	104
Empress Ave.	240	229	474	508	1.9	2.2	115
Grand Ave.	96	87	219	207	2.2	2.3	104
King St.	50	44	125	88	2.5	2.0	80
Lorne Ave.	423	393	1,010	996	2.3	2.5	108
Princess Ave.	124	136	307	346	2.4	2.5	104
Quebec St.	48	43	104	99	2.1	2.3	109
Rectory St.	186	199	399	474	2.1	2.3	109
Richmond St.	45	43	87	84	1.9	1.9	100
Simcoe St.	327	358	720	883	2.2	2.4	109
St. George's	511	515	1,175	1,240	2.3	2.4	104
Talbot St.	293	268	665	665	2.2	2.4	109
Victoria St.	305	269	691	682	2.2	2.5	113
Wortley Rd.	251	243	517	500	2.0	2.0	100
Sacred Heart	46	47	123	120	2.6	2.5	96
St. Mary's and St. M.	104	111	213	246	2.0	2.2	110
St. Nicholas	40	35	101	107	2.5	3.0	120
St. Peter	152	129	314	295	2.0	2.2	110
Coll. Inst.	298	282	991	1,003	3.3	3.5	106
	4,451	4,452	10,139	10,844	2.27	2.43	107
	8,903		20,983		2.35		

To get a clear view of the children under consideration it is necessary to picture to oneself the twenty-two groups, each of approximately the same number of each sex; the ages of each group ranging from infants in arms to twenty-one years or in a very few cases, to twenty-four.

Table No. 4 gives the total attacks of each of eight infectious diseases suffered by this particular set of children, tabulated to show the attacks by sex.

The eight diseases tabulated were chicken pox, diphtheria, German measles, measles, mumps, pneumonia, scarlet fever and whooping cough.

It will be noted how closely the attacks per child agree in the twenty-one groups, exclusive of the Collegiate Institute. In the Collegiate Institute the attack rate (irrespective of sex) is 3.43 as against the similar attack rate for the remaining children of 2.28; or about 50 per cent. higher. This depends, as will be conclusively shown later, on the greater average age of the Collegiate Institute children.

TABLE NO. 3.—SHOWING COMPARATIVE ATTACKS OF EIGHT INFECTIONS IN MALES AND FEMALES

Schools.	Total males.	Total females.	Chicken pox.		Diphtheria.		German measles.	
			Males.	Females.	Males.	Females.	Males.	Females.
Wortley	251	243	86	77	11	22	18	15
Rectory	186	199	66	81	7	11	14	20
St. Mary's and St. Martin's	104	111	32	37	5	8	8	10
Collegiate Inst.	298	282	185	176	41	36	41	53
	839	835	367	371	64	77	81	98

Schools.	Measles.		Mumps.		Pneumonia.		Scarlet fever.		Whooping cough.	
	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
Wortley	135	139	81	64	26	22	35	32	125	129
Rectory	114	136	60	69	20	20	18	22	100	115
St. Mary's and St. Martin's	58	69	34	34	9	9	13	16	54	63
Collegiate Inst.	256	255	162	171	35	27	87	89	184	196
	563	599	337	338	90	78	153	159	463	503

Perhaps the most striking point brought out is the higher attack rates shown for females, reaching an average for the total of about 7 per cent.

To which disease if any is this higher rate attributable?

The Collegiate Institute, as one group of older children, and St. Mary's and St. Martin's, Wortley Road and Rectory as a second group showing all ages, chiefly eight to fourteen are given above by age and disease (Table 3.) It will be seen that, so far as these figures go, no very noticeable

TABLE NO. 4.—SHOWING TOTAL ATTACKS OF EIGHT INFECTIONS.

Schools.	Total children.	Total attacks.	Chicken pox.	Diphtheria.	German measles.	Measles.	Mumps.	Pneumonia.	Scarlet fever.	Whooping cough.
Aberdeen	816	1,573	282	49	47	420	215	72	84	404
Alexandra	330	809	145	24	25	222	106	42	64	181
Chesley Ave.	699	1,593	284	47	71	412	197	67	75	440
Colborne St.	88	230	45	5	8	58	31	7	15	61
Empress Ave.	469	982	142	0	47	319	148	33	58	235
Grand Ave.	183	426	86	13	27	117	55	14	23	91
King St.	94	213	34	4	8	71	17	8	11	60
Lorne Ave.	816	2,006	421	38	64	531	329	61	121	441
Princess Ave.	260	653	120	18	25	155	123	21	42	149
Quebec St.	91	203	40	0	8	49	23	8	9	66
Rectory	385	873	147	18	34	250	129	40	40	215
Richmond	88	171	40	3	3	52	18	5	15	35
Simcoe	685	1,603	297	47	65	443	200	65	127	359
St. George's	1,026	2,415	415	56	107	651	406	87	122	571
Talbot St.	561	1,330	213	33	52	396	174	53	92	317
Victoria	574	1,373	242	35	69	376	191	63	71	326
Wortley Rd.	494	1,017	163	33	33	274	145	48	67	254
Sacred Heart	93	243	44	7	6	70	31	4	19	62
St. Mary's and St. Martin's	215	459	69	13	18	127	68	18	29	117
St. Nicholas	75	208	30	4	11	61	45	6	13	38
St. Peter	281	609	79	19	14	204	95	24	37	137
Collegiate Inst.	580	1,994	361	77	94	511	333	62	176	380
	8,903	20,983	3,699	543	836	5,769	3,079	808	1,310	4,939

emphasis is laid on any one disease, the tendency being for the females to run higher in all. The discrepancy is less marked in the Collegiate Institute however.

In this table, the total attacks are separated into their component parts. Here again the striking point is the extreme uniformity of the twenty-one public school groups; and the higher figures of the Collegiate Institute.

It is also worth noting that over one half of the total attacks of these eight diseases are due to measles and whooping cough; chicken pox and mumps, each contribute about one seventh; scarlet fever one fourteenth; and the other three together about one tenth.

TABLE NO. 5.—SHOWING NUMBER OF CHILDREN AT EACH AGE WHO HAD BEEN SICK IN THE FOUR SCHOOLS.

Wortley Rd., Rectory St., St. Mary's and St. Martin's.

Age.	Total well males.	Total well females.	Total sick males.	Total sick females.	Total well.	Total sick.	Grand total.
1	12	18	4	3	30	7	37
2	12	13	8	4	25	12	37
3	6	11	8	6	17	14	31
4	11	6	20	15	17	35	52
5	14	11	32	24	25	56	81
6	7	12	33	39	19	72	91
7	7	6	44	44	13	88	101
8	6	4	41	43	10	84	94
9	2	2	41	46	4	87	91
10	1	1	47	44	2	91	93
11	1	0	39	32	1	71	72
12	3	1	37	32	4	69	73
13	0	2	28	29	2	57	59
14	1	2	24	35	3	59	62
15	1	3	17	14	4	31	35
16	0	0	12	13	0	25	25
17	0	1	6	7	1	13	14
18	1	0	8	10	1	18	19
19	1	0	4	11	1	15	16
20	0	0	2	9	0	11	11

The extremely widespread distribution, practical universality, of these infections is shown by a list of the sick and well at each age for St. Mary's and St. Martin's, Wortley Road, Rectory and Collegiate Institute. It will be seen that after the age of eight there are almost no children reported as free of one or other of the eight infections.

There are many other items of valuable information yet to be worked out from these figures as time may permit, but the immediately practical point now available is the demonstration of the enormous numbers of these infections actually occurring day after day, year after year, in excess of any official figures collected or published. This excess may be estimated from the tables already given; but more accurately by calculations from the actual returns showing what the returns would be had we them all. Since not far from one half of the total children are here recorded, the factors applied are not so large as to be unusually fallacious.

CALCULATIONS SHOWING THE NUMBER OF ATTACKS IN A STANDARD POPULATION OF 50,000.

The United States Standard Million (United States Census Bureau, 10th Annual Report, Table XII, page 426) gives the relative figures for 1,000 population as:

TABLE NO. 6.

Under five years	12.0% of the total population.
5 — 9	11.6 " " "
10 — 14	10.6 " " "
15 — 19	9.9 " " "
	44.1% of the total population.

The same proportions, but expressed as a percentage of the total children (under 20), *not* of the total population, would be:

TABLE NO. 7.

Under 5 years	27.2 of total under 20 (Standard Population).
5 — 9	26.3 " " " "
10 — 14	24.0 " " " "
15 — 19	22.4 " " " "
	99.9 of total number under 20.

Taking the 1,094 children of the Wortley Rd., Rectory St., St. Mary's and St. Martin's Schools (merely because these figures are now available), the 1,094 children there included show the following relative proportions amongst themselves:

TABLE NO. 8.

Under 5 years	11.6% of the group, 1094.
5 — 9	42.0 " " "
9 — 14	35.0 " " "
15 — 19	10.0 " " "
20	1.0 " " "
	99.6%

Hence it is evident that, as is quite natural considering the method of collecting the data (*i. e.*, through the schools) the school children are in great excess of the usual proportions. The figures, if the returns had been in actual proportion to the age distribution of an ordinary standard population, would have shown the following (the group of 458 children, 5–9 years old, is taken as the 26.3 % of the table, No. 7, above):

The Actual Total Infections per age group in London were as follows:

TABLE NO. 9.

1,094 children		Total infections.	Infections per child.
Under 5 years..........	157	96	0.61
5 — 9.............	458	868	1.90
10 — 14.............	359	1,029	2.87
15 — 19.............	109	322	3.00
20	11	34	3.09
	1,094	2,349	2.14

Calculated for a group standardized to agree with the United States Standard Million the following results are found:

TABLE NO. 10.

Standardized group.		Infections per child.	Calculated infections.
Under 5 years..........	474	0.61	289
5 — 9...........	458	1.91	870
10 — 14...........	418	2.87	1,200
15 — 19...........	390	3.00	1,170
	1,740	2.03	3,529

Calculated for a standard thousand of any standard population we get the following:

TABLE NO. 11.

Standard.		Infections per child.	Calculated infections.
Under 5 years...........	120	0.61	73
5 — 9............	116	1.90	220
10 — 14............	106	2.87	304
15 — 19............	99	3.00	297
	441	2.03	894

For each standard thousand there are 441 persons under 20, representing 894 infections. Hence for 50,000 population there are (441 x 50) 22,050 persons under 20, having 44,700 infections; and 27,950 (50,000–22,050) 20 years old and upwards, having 83,850 (27,950 x 3) infections—a total for the 50,000 population of over 128,000 infections.

Note—for ease in calculation, the round number of 2.5 infections per head of a general standard population would give a fair average figure for the number of attacks of the eight listed infections suffered. This figure is based on the ground that adults suffer so little from these infections as to make the attacks added after 20 years of age negligible; but of course concerning typhoid fever, tuberculosis, smallpox and pneumonia, adults suffer as much or more than children, except in so far as vaccination may affect smallpox, or anti-typhoid inoculation may affect typhoid.

TOTAL ANNUAL ATTACKS CALCULATED FOR A POPULATION OF 50,000.

The annual attacks suffered by a standard population of 50,000 may be deduced as follows:

Calculated infections for total children in each 1,000 of the population.		Annual average.
Under 5 years......	73; since these were suffered within 5 years, there were per year at least 73÷5=	14 per year
5 — 9........	220 " " " ÷ 9	24 " "
10 — 14........	304 " " " ÷14	21 " "
15 — 19........	297 " " " ÷19	15 " "
	894	74

At 74 attacks per 1,000, a standard population, totalling 50,000 would yield 3,700 attacks per year, of the eight infections we are dealing with.

Taking the proportions of the eight different infections to each other as laid down on page 5, this would yield annually attacks of each disease as follows (very rough approximation):

Attacks of each of eight infections for 50,000 population per annum.

Measles, one-fourth (about) of total attacks, 925; whooping cough, one-fourth (about) total attacks, 925; chicken pox, one-seventh (about) total attacks, 530; scarlet fever, one-fourteenth (about) total attacks, 215; mumps, one seventh (about) total attacks, 530; pneumonia, diphtheria, German measles, together one-tenth (about) of total attacks, 370.

THE SOCIAL EVIL IN RELATION TO THE HEALTH PROBLEM.

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Health Officer, Cincinnati, Ohio.

Read before the General Sessions, American Public Health Association, Colorado Springs, September 11, 1913.

Most health problems resolve themselves into questions of heredity or environment. The health problem presented by the social evil is a question involving both of these and, in addition, the sexual instinct. The three combined produce a problem that has vexed mankind throughout all history.

Sexual intercourse is a response to a primal instinct; an instinct as insistent as that of hunger or thirst. Its promiscuous gratification creates the social evil with its attendant health problem.

Man's lust is the corner stone on which the whole problem rests. Heredity and environment are conditions created by man's lust and, once established, form a vicious circle which contaminates those coming within its influence.

Until quite recently the medical profession has been chiefly concerned in caring for the pathological end of the problem; dealing with end results.

No sanitary problem has ever been solved by caring for its victims. Treating syphilis and gonorrhœa has about as much influence in getting at the base of the evil as would the snipping off of a few leaves have in cutting down a forest.

Practically everyone has a remedy. All of these remedies fail when applied. Social ostracism, branding, imprisonment, burning at the stake—all have failed.

Recently it has been suggested that visitors to places of prostitution be photographed, and by another social worker that they be compelled to register their names. These suggestions were made in all seriousness and are given as samples of the impractical ideas that are being born. It is easy to imagine with what leaps and bounds the Doe family would multiply and how the snapping of photographic shutters would produce a din like unto the roar of a rapid fire gun had these two methods been placed in operation.

Any scheme which ignores the sexual instinct as the basic cause of the social evil is bound to fail.

Education, segregation, suppression, regulation, and medical inspection have all been tried, and all have failed. They have failed because you cannot eliminate a primal instinct by education. Segregation failed because only a small proportion of prostitutes declared themselves, and segregation—no difference how perfect it may be—does not eliminate the social evil but simply concentrates it within certain boundaries.

Suppression failed because it does not suppress but scatters and multiplies the centers of infection.

Regulation failed because it was a compromise and because it placed an instrument in the hands of officials that was used for purposes of extortion and blackmail and that led to the debauching of public officials.

Medical inspection, the only method which gives any reason to hope that the evils resulting may be mitigated, has failed or succeeded according to the individual point of view. As carried on in this city by some private physicians, it not only contributes to moral delinquency but actually increases the number of cases of venereal disease.

A sanitary inspection was recently made in this city of about one third of the inmates of known houses of prostitution. Twenty per cent. of the inmates were found diseased and were working under certificates of health dated within a week of the inspection and, in most instances, within from twenty-four to forty-eight hours of the inspection.

In a number of cases the diseased prostitute was under treatment for venereal disease by the man signing the certificate of health, in which he stated over his signature that she was free from venereal disease.

This is not medical inspection, but one way of securing money by false pretense, and leaves no doubt as to which is the worse prostitute, the woman or the physician signing the certificate.

Some people see a solution in a minimum wage law. Granting the constitutionality of such a law, how are employers of labor to be forced to employ people whose services are worth less than the minimum wage?

On the present standard of wages, a great army of women is living respectably and comfortably, although not luxuriously. What is to become of these if a minimum wage law makes it impossible for them to work? They must eat, have clothing, and places of shelter! Isn't there a very grave probability that the method employed, instead of protecting them from lives of prostitution, will throw them into it as the only source of livelihood?

Dr. Watson has said that an investigation of the reasons for leading lives of prostitution disclosed the fact that only 10 per cent. of these women are in houses of prostitution because of failure to make a living in other walks of life. Would a minimum wage law, even if possible of universal enforcement, remove the basic cause of the social evil?

The numerous scandals in families rich in this world's goods have no possible connection with low wages and give the lie to those who would lay the whole blame on the poor.

Others find a solution in a single standard of purity. Back of everything that exists lie definite causes, and the double standard of purity exists because of a variety of reasons.

Society condones man's moral lapse. If a woman falls, she is eternally damned. Society merely elevates its eyebrows when a man goes wrong. He is the victim of a designing woman. When the woman comes up for judgment, it is a case of thumbs down. The father of the race may be a past master in debauchery, but society demands that the mother be without taint or blemish of immorality. These are some of the reasons why the double standard of purity exists.

Differences in environment, due to occupation, multiply the opportunities leading to man's temptation. This is another reason for the double standard. Another is woman's fear of maternity with the attendant disgrace. And still another, more potent than all others combined, a double standard of sexual desire.

Would the establishment of a single standard wipe out these reasons? It has taken at least sixty centuries to transform man's best friend, the dog, into the docile animal he is today. By what feat of necromancy is a Russian wolf to bridge the centuries at a single bound? How is man to have his sexual instinct robbed of its dross, thereby placing him on a par with woman? Who would suggest that her high ideals be toned down thereby consigning her to the ooze and slime of man's moral degradation?

A few years ago a college professor in a neighboring city leaped into infamy by advocating a season of immorality for women, claiming that the experience gained thereby would "fit them to become better wives and mothers."

This is given for the sole purpose of illustrating the degree of imbecility possible of attainment by some of the half-baked theorists who labor under the mild delusion that they are thinkers.

What are some of the more important factors contributing to the social evil and to the health problem under discussion?

Modern industrialism is one of the most important. America is rapidly becoming urban. The occasional contact of the sexes found in rural districts has given way to practically constant contact in the cities. Woman's sphere in the world has ceased to be domestic, and every day finds her invading some occupation heretofore filled by man. Opportunities for deviating from the straight and narrow path do not have to be arranged; they just happen as a natural result of environment.

Every time that a match is struck in a powder magazine, the element necessary for an explosion are present. In proportion as modern industrialism brings the sexes in close contact, in the same proportion are the chances of sexual explosions made possible.

The infidel and agnostic have contributed materially to the spread of vice. Religion is a powerful deterrent in preventing immorality. It not only accomplishes this by reason of the lofty ideals taught but by engendering a wholesome fear of future punishment. Moral precepts taught in the home and in the church at the most impressionable period of life are not easily brushed aside.

It is not to be assumed that all infidels and agnostics are immoral any more than it is to be assumed that all professed believers in God are moral, but, other things being equal, the deeply religious man is less liable to yield to temptation than his brother who has no religious scruples to restrain him.

The medical profession is partially responsible for the health problem due to the social evil.

Some physicians advise young men to commit immoral acts, giving as a reason that continence is followed by nervous conditions due to a failure to exercise a normal physiological function. While this may be true in a few isolated instances, it can be said without fear of successful contradiction that where continence causes one neurasthenic, incontinence causes hundreds to go insane, or to become paretic, or blasts the offspring with idiocy or with blindness from birth, or sends him through life with the evidence of a dissolute ancestry stamped on his features.

In no other condition, with the possible exception of alcoholism, are the sins of the father visited upon the children with greater certainty than in venereal diseases.

"The increased cost of living" is a cause of prostitution according to some students of the problem. This statement bears a very close resemblance to the old feat of getting the cart before the horse. The Vice Commission of Chicago, after a very careful and painstaking investigation covering a period of nearly one year, estimated that the 1,112 prostitutes under surveillance by the commission cost that city $16,000,000 annually.

Isn't it nearer the truth to say that increased cost of living is a result of prostitution rather than a cause of it? Who supports vice, the indigent public or the well-to-do?

The claim has been made time and time again that without the support of married men 50 per cent. of immoral houses would go out of existence.

An incident occurring during the recent sanitary survey may throw some light on this phase of the problem. In what is technically known in red-light society as a "five dollar house," nine inmates were examined and four found actively infectious. The madam registered a vigorous protest in the health department against quarantining these four, giving as a reason that there couldn't possibly be anything wrong with her "little girls" as they entertained regular customers only and that these were all married men.

The divorce courts furnish as substantial an alibi for the poor man as it does for the poor woman. The odium attached to the social evil cannot be unloaded on the poor. Rich and poor men alike have the sexual instinct but poverty entails limitations on its promiscuous gratification and thus it comes about that much of the history of the world deals with the immorality of the rich and powerful.

Lack of occupation contributes enormously to the social evil with its attendant health problem. An excess of this world's goods over that actually necessary means idleness in the vast majority of instances.

Man must have an occupation, and a legitimate one is the best balance wheel in the world. To have a legitimate occupation, the majority of people must have an incentive to work. Means to buy food, clothing and shelter and lay aside a bit for the rainy day are the usual incentives to work. Take these away, and man is left without a legitimate occupation. Too often he drifts into various forms of dissipation, In every community of any considerable size can be found idle rich men whose chief diversion is the pursuit of women. They become professional seducers, and their victims furnish a considerable proportion of the inmates found in immoral houses.

Inherited wealth is one of the heaviest handicaps a young man can carry. Man lies, cheats, steals, and sometimes honestly acquires money in order that he may pile up a fortune for his children, with constant examples before him showing that this is one of the surest ways of damning his offspring.

Lascivious books and plays and errotic pictures are responsible for a considerable number of lapses from the straight and narrow path.

While some of the most powerful sermons are preached from the stage, too often the tendency is towards the corruption of public morals.

Several months ago a comic opera was presented in one of the leading theatres of this city which offended every sense of moral decency. With but few exceptions the female characters impersonated were denizens of the twilight zone.

School teachers will tell you that innocent children, hardly old enough to be out of their mothers' arms, have been found with books reeking with obscene pictures and stories.

Several years ago the Cincinnati market for books was flooded with an edition of old stories, the sale of which had been held up by Federal Court action because of their erotic nature. Following this action, the books were released for sale by a judge who must have been a mental and moral pervert. The facts were given due prominence by the advertisers and, from a list of subscribers shown by the salesman, quite a number of private libraries in homes in this city have these alleged evidences of good literature on their shelves.

Styles in dress are dictated very largely by the prostitutes of Paris. They are designed for the purpose of showing to the best advertising advantage the figure of the wearer. These styles are copied all over the world and by women who would be properly horrified at the idea that they were contributing to the temptation and fall of man. Miss Ida Tarbell, in a recent article in the *New York World*, has the following to say concerning woman's part in her own downfall: "After all the arguments have been advanced to prove that upon man should be placed the blame when women sacrifice their virtue, the plain fact remains that, except when violence is employed, the issue depends finally upon the consent of the woman. What I mean is that many unthinking women will, whenever occasion offers, use their sex, consciously or unconsciously, for the purpose of gaining influence over men. If the matter is faced frankly, it is precisely a man hunt, the ordinary parade on the street, disguised if you will by silks and lace, but none the less a man hunt."

The influence of alcohol as a contributor to moral delinquency and to the social evil with its attendant health problem cannot be over-estimated. The saloon is the most powerful factor in the pollution of a community. Alcohol destroys judgment and dissipates fear of consequences. It is supposed to act as an erotic stimulant, but the truth is that it paralyzes fear of responsibility.

A large percentage of cases of venereal disease are contracted while the victim is under the influence of alcohol. Judgment and discretion are thrown to the four winds, and with them centuries of training and refinement. Owing to the widespread systemic paralyzing influence of the poison, resistance is lowered and infection is made easy. Cut out the saloon, and the sale of intoxicants in disorderly houses, and a great step towards the solution of the social evil will have been taken!

In Chicago all houses of prostitution have been suppressed in the old segregated district. Prostitution is still carried on, however, in connection with a large number of saloons, the claim being made that the liquor interests are using their power to defeat suppression in these places. If this is true, it is difficult to understand just what has been accomplished in closing the segregated district.

When Pandora let loose the vices, they mated and other vices were born, exhibiting in full degree the ancestral taint. These in turn mated, and so the process went on until the finished degenerate product of them all, a two-headed monster, alcoholism and prostitution, came into the world.

Having thus briefly considered a few of the important causes making the social evil possible as a health problem, what can be said concerning the various methods used to minimize that problem? What would be the result if cases of the plague were segregated within certain defined areas and plague-infected rats were permitted to run at large? How soon would an epidemic of cholera be suppressed if patents sick with this disease were given hospital treatment and their evacuations unsterilized cast into some stream from which cities and towns obtained their water supply?

Of what value would medical inspection be in an outbreak of smallpox in which women only were subjected to inspection and isolation?

Great difficulty is experienced in arriving at a conclusion as to what method of handling the social evil promises most in solving the health problem created by the evil.

Segregation certainly does not solve the problem for it does not segregate. No one advocating this plan has claimed that it touches more than a small minority of women engaged in prostitution.

Prostitution is prostitution whether the prostitute carry on her profession publicly or clandestinely. The disease resulting from it is just as sure to follow whether she operates from a known center or by stealth. Concentration of all immoral women, even if possible, would have no effect on the health problem except to make it more difficult of solution. It would, to an extent at least, legalize an illegal act and throw a mantle of protection about a course of conduct that, according to law, should be suppressed with an iron hand. It tears down all the barriers erected by society and makes immorality easy where it should be difficult or impossible. It hands over to the authorities in control an instrument for blackmail that has led to endless scandal and that has resulted in every variety of crime from extortion to deliberate assassination.

Education in sex hygiene unquestionably has done a great deal of good, but it has its limitations. Many of those best qualified, from an educational standpoint, to resist temptation are far from being examples of morality, and the possession of knowledge does not necessarily mean its application.

Very few people are qualified to teach sex hygiene to children. Very few parents know enough about it, or possess the tact if they are informed, to make it a safe subject for discussion, and fewer still are so constituted that they can assume the big brother or big sister attitude towards their children which is so essential in developing character.

A shocking number of children are given a free hand in selecting their associates and going where they please by night and by day. The wonder is that so many of them escape the pitfalls on every hand.

Where individual members of society ignore their responsibility to their children, society at large should adopt some plan that would force children under a certain age to be at home during a certain specified time.

Education will accomplish nothing with the inherently vicious or defective individual, but it might easily save a large number who acquire vicious habits through no fault of their own.

Education will not eliminate the sexual instinct, but it will place at the disposal of individuals a knowledge of the dangers incurred that will act as a powerful curb in preventing its promiscuous gratification.

Medical inspection is employed in various European and American cities. It is good or bad according to the individual point of view. Theoretically, one diseased prostitute separated from her business should remove one dangerous center of infection, and the good thus accomplished should be multiplied by the total number of centers of infection eliminated.

One great trouble with medical inspection has been that it has failed to eliminate the diseased woman. As a means of petty graft, it has been a success.

The lying certificates of health secured by a payment of fifty cents serve one useful purpose in that they illustrate the market price placed on some souls by their owners.

Many doubt its value, even if carried on honestly, claiming that it fails to reach the most numerous and that most dangerous class of prostitutes the clandestine; that the certificate of health creates a false sense of security and stimulates immorality to such an extent that the good done by the elimination of one center of infection may be more than neutralized by an increased number of exposures; that a certificate of health issued in good faith and on good evidence at a certain hour of the day may be absolutely misleading fifteen minutes later; that, in the Philippines, medical inspection stimulated immorality and houses of prostitution were crowded with patrons immediately after inspection had occurred; that medical inspection with the issuance of certificates of health by a municipal department in reality amounts to licensing an illegal act; that it is the equivalent of what would result if a known counterfeiter was given a working certificate to go ahead and do business as long as he was not found with spurious coin in his possession; and that prostitution is illegal whether medically inspected or segregated, and any attempt at either can only be construed as an attempt to evade the law or as an acknowledgment that any attempt made to reach the condition by legal methods is a failure.

The results obtained in Norfolk, Va., would seem to throw considerable doubt on the correctness of some of these conclusions. Medical inspection is conducted every two weeks. Infectious cases are quarantined in the hospital. An average of 3,000 sailors are in the marine barracks and training station. Before inspection was inaugurated, an average of 250 cases of venereal diseases was under treatment. Since this plan was adopted, the average has fallen to 15, and the number of prostitutes under inspection has fallen from 700 to 400. Dr. Schenck expresses the opinion that inspection has decreased both prostitution and immorality.

Suppression has at least one strong argument in its favor, it is consistent with the law. Chicago, Minneapolis and Los Angeles have no segregated vice district. This result has been brought about largely through the recommendations of vice commissions after a careful investigation of local conditions in the various cities.

Suppression has, to an extent at least, interfered with commerciallized vice. It has made it more difficult for panderers to dispose of their supply and has temporarily, at least, embarrassed the pimp in his capacity as manager.

By eliminating prostitution in certain prescribed areas, it has made excursions to these places impossible and has furnished business men with a legitimate excuse for failing to entertain some country customers in a way that has prevailed to a considerable degree in the past.

Groups of boys and young men who went to see the sights, got drunk and then received infection, are safer than they were before suppression occurred.

Whether any real and lasting good has been accomplished has not been settled.

In Chicago, semi-respectable places have given way to the combination of saloon and house of prostitution.

In Minneapolis, to quote from her vice commission's report, "there has never been a period in Minneapolis within the memory of members of the commission when the conditions as regards public prostitution were so generally satisfactory from the standpoint of the moral welfare of the whole community," and that "given a capable police administration, the evils of prostitution in Minneapolis can be kept down to a minimum under a system that will not recognize or tolerate it in any form," that "street-walking, at least in its most obvious manifestations, has been greatly lessened as a factor in public prostitution," and that "the acknowledged brothel has ceased to exist in this city."

In suppressing prostitution in Minneapolis, one hundred and twenty inmates were affected. What became of them? To quote once more from the report in answer to this question: "Many of these left the city promptly . . . some of those remaining in the city located themselves in the residence districts, where they have been living quietly, confining their operations to downtown hotels and rooming houses. Others, who had been proprietors of brothels, retired to their private homes and have continued to live quietly. Still others joined women of their own type who had been living in downtown business blocks or in flats or furnished rooms in the district between business and residence neighborhoods and have there been plying their trade singly or in pairs . . . many of the houses contained in the old First Street District are now occupied by women clandestinely plying their trade of prostitution. These places carry the disguise of hotel or tobacco and soft drink stores. The women are relatively few in number, from one to three in a place. The inmates operate with extreme caution, with no outward signs of the character of the place, under constant harrying of the police, and subject to frequent raids and fines."

The report directs attention to "the increasing use of the telephone as an agency in prostitution" and "the growing use of the assignation house and private flat."

It also refers to the fact that "while women have been generally excluded from saloons, there are several so-called cafés in the city whose operations are so flagrantly opposed to good public morals as to suggest strongly the necessity for official action. These places, ostensibly restaurants, cater almost exclusively to the wet goods trade. In practice they provide rendezvous for large numbers of prostitutes and their partners and are rapidly transforming a respectable retail business street into a tenderloin district."

Under the heading, "Young Girls on Our Streets," the report continues: "One of the most disturbing phases of the present situation in Minneapolis, and an alarming social symptom, is the large number of young girls in the streets at night in the downtown sections and in the business districts of the outlying sections. They may be found in numbers loitering about the fruit stores, drug stores and other popular locations, haunting hotel lobbies, crowding into the dance halls, the theatres and other amusement resorts, also in the saloon restaurants and chop suey places, and parading the streets and touring about in automobiles with men. It would be not fair to charge that all or a large proportion of these girls are prostitutes. It is perfectly plain, however, that many of those who are not are on the direct road."

While disclaiming that this condition is due to a closing of the old Sixth Ward Resorts, or that it is peculiar to Minneapolis, the report adds, "that there are those who have deep convictions that there is a direct connection."

"Lack of home discipline," is given as the probable explanation. As evidence of the "seriousness of the situation," whatever its cause may be, the report gives the result of a police census made in the evening of June 7 when "there were observed on the streets that evening, after 10 o'clock girls, apparently minors and without adult escort, to the number of 1,646."

The beauty about this report lies in the fact that it permits of satisfactory conclusions being drawn from any and all points of view.

The believer in suppression points with pride to the fact that, "There are no places known to the commission where prostitutes are openly entertaining visitors."

In admitting that women are carrying on their occupation in "downtown hotels and lodging houses"; "the growing use of the assignation house and private flat"; the rapid transformation of "a respectable retail business street into a tenderloin district"; and the debauching of any considerable proportion of the 1,646 young girls seen on the street in one evening after 10 o'clock without adult escort, the report certainly furnishes highly explosive material for the man who believes that suppression fails to suppress but that it does scatter.

Is prostitution less dangerous when concentrated than it is when scattered and wearing the mask of a tobacco shop or a soft drink place?

Which offers the greater opportunity for the procuress to work the downfall of young girls, an open and avowed house of prostitution where contact with innocent girls is impossible or an alleged place of legitimate business that makes contact easy and frequent?

Are the morals of a community safeguarded by transferring prostitution from a so-called segregated district to assignation houses and private flats?

Is gonorrhœa less liable to blind the infant or make an invalid of the wife, or will the offspring of a syphilitic come into the world free from the ancestral curse because the prospective husband and father contracts his disease in more respectable surroundings?

Assignation houses and private flats are more dangerous than public houses of prostitution. Many people of both sexes will go to them who would be horrified at the idea of entering a house of prostitution. They are training schools for vice, and their finished product is the professional prostitute. The closing of these places in Cincinnati has been a real step towards suppression for the reason that it has cut off one source of supply.

Los Angeles is another city in which public prostitution has been suppressed. In order that more than one opinion could be secured as to the results obtained, letters of inquiry were addressed to the mayor, health commissioner, and chief of police of that city. They are unanimous in reporting that no public house of prostitution exists in that city and that street-walking is prohibited. The health commissioner was unable to say whether venereal diseases had increased or decreased because no records of the prevalence of the diseases are kept.

The mayor states that street-walking occurs at infrequent intervals and that it is immediately suppressed by arrests and fines.

The answer of the chief of police seems so fair a statement of existing conditions in Los Angeles that it is given in full:

"In reply to your inquiry concerning the manner in which we have attempted to solve the social evil, I beg to reply that it is not claimed by us that the problem has been solved, but that, at least, a step towards its solution has been taken. So long as you tolerate the segregated district or parlor house district, you have the same conditions to face, and the same problems to handle. Whether or not the abolition of the segregated district gives rise to other problems just as difficult to handle cannot be answered off hand, but, at least, the foundation has been laid on which to build anew.

"It is true there are no houses of prostitution known as such and running openly. It is also true that although the segregated district has been abolished, the police department is kept busy ferreting out these moral lepers, obtaining evidence, prosecuting and obtaining sentences on vagrancy charges. Friends of the segregated district claim that the only result has been to scatter prostitutes throughout the city; it is also claimed that there has been an increase in venereal diseases. The difficulty in either proving or disproving these claims lies in the fact that it is practically impossible to obtain any authentic figures or statistics. Whether or not we have succeeded even partially in solving the question, therefore, is a matter of personal opinion. For myself, after years of police experience, I want to go on record as stating emphatically that I am opposed to segregation.

"My opposition is based primarily on two arguments:

"1. Segregation fails to segregate.

"2. Segregation means graft in any administration.

"The principal argument of the proponents of segregation is that by such means it is possible to enforce proper health regulations. From many years observation in the former "crib" district, however, I maintain that under the old system here, there was practically as much evil scattered throughout the city as at the present time. Quack doctors thrived then as now, and I cannot see that the youth can be "saved" by putting the civic stamp of approval and protection upon prostitution.

"Closing the red-light district has had the decided effect of putting a damper upon street-walking. It is not to be denied that there still exist isolated cases, but they are kept on the move through our ordinances and strenuous police work. During the fiscal year ending June 30, 1912, the police department, including the Metropolitan Squad in charge of this branch of work, made 34, 561 arrests. Of this number 117 were for keeping houses of ill fame; 35 cases of adultery; 16,517 cases of drunkenness; 1,678 for disturbing the peace; 72, felony, and 2,757 for vagrancy. On account of the many sections of our vagrancy laws, it cannot be ascertained how many of these vagrancy cases were for prostitution, but it is safe to say perhaps that 50 per cent. were from that cause. I can state authoritatively that since the abolition of the crib district, there has been less crime of a serious nature in this city."

It will be noted that during 1912, 117 arrests were made for keeping houses of ill fame, 35 for adultery, and about 1,378 for prostitution.

Here again conflicting testimony is presented, and our difficulty in arriving at a correct conclusion as to the value of suppression is made still more difficult.

It is quite evident that prostitution still exists in the city of Los Angeles, in spite of the fact that probably more strenuous efforts have been made to eradicate it than in any other city in the United States.

What can be said of the waste in lives, invalidism, and money?

Students of this problem have estimated that "450,000 young men in this country are infected every year, that 80 per cent. of the deaths from inflammatory diseases peculiar to women, 75 per cent. of all special surgical operations performed on women, and over 60 per cent. of all the work done by specialists in diseases of women are the result of gonococcus infection.

"In addition, 50 per cent. or more of these infected women are rendered absolutely and irremediably sterile.

"Fully 80 per cent. of the ophthalmia which blots out the eyes of babies and 20 to 25 per cent. of all blindness is due to gonococcus infection.

"Syphilis is transmitted to the offspring in full virulence. Its effect upon the product of conception is simply murderous. Sixty to 80 per cent. of all infected children die before being born or come into the world with the mark of death upon them.

"The fact that these diseases constitute the most potent factor in the causation of blindness, deaf mutism, idiocy, insanity, paralysis, locomotor ataxia, and other incapacitating and incurable affections, imposes an enormous charge upon the state and community. Millions of dollars are contributed to the support of defectives, but not a dollar to the dissemination of the saving knowledge which might prevent."

Before venturing to prescribe a method of dealing with this problem, I desire to make my position absolutely clear on several points without retracting in any way what has already been said:

First. I believe in a single standard of purity based on continence, not on incontinence.

Second. I believe in working for a system of education on sex relations which will acquaint developing youths and maidens with a knowledge of the pathological results due to immoral practices.

Third. I believe in working for the complete eradication of the social evil whether it be conducted openly in known houses of prostitution or secretly in assignation houses and private flats or in places disguised as tobacco or soft drink shops.

Fourth. I believe in working for the correction of social and economic conditions which are partially responsible for conditions as they exist today.

Fifth. Realizing, as we all must, that the ideal conditions outlined are difficult to bring about and that years must pass before they are obtained, I believe that the health problem created by the social evil should receive the same careful attention from the medical profession that is accorded other infectious disease problems.

Prophylaxis is not only the watchword in modern medicine, but its pride and glory. The debt owed our profession is not because of those we have cured but because of those we have kept well; not because of emergencies met, but because of emergencies avoided.

Up to the present time, the deadly effects of gonorrhœa and syphilis have been overshadowed by the moral side of the question.

Illegitimate sexual congress with its deadly train of complications has not been considered a subject fit for discussion or one upon which the general public should be enlightened.

Would it not be better to bring it forth from the shadows and place it naked before the world where the spot light of publicity can beat upon it?

While it is not to be expected that any plan will entirely remove the social evil, there are strong reasons for believing that many of its evil consequences can be avoided by education and prophylactic methods.

The fact that all of its evil results cannot be eliminated is no reason why an attempt should not be made to minimize them. The fact that venereal disease is contracted through an act of immorality, is no reason why the innocent victims of that immoral act should not be protected from the consequences of it.

The cause and method of transmission of venereal diseases is known. Norfolk, Va., the army and the navy have demonstrated the method of prevention to those exposed. Shall we sit quietly and dream of the millennium, or shall we accept man as he is and protect him and his future wife and children from the evil consequences of his immorality?

Medical inspection of prostitutes and the use of prophylactic means to avoid infection after contact will not prove to be a popular subject for discussion. It will not eliminate prostitution, but it does offer a partial remedy against its evil results. It is in harmony with what is being done to solve other infectious disease problems.

Until the time arrives when man shall be the master of his sexual instinct instead of its slave, our duty as sanitarians is as binding to protect him from the evil consequences of this slavery as it is to safeguard his food and water supplies; our moral responsibility to protect his wife and children, as great as if he exposed them to the plague.

While diverse opinions paralyze efforts directed to a sane solution of this problem, degeneracy is gaining a firmer hold on future generations. While we question one another's honesty of purpose, when our opinions differ as to what shall be done, the pit for our descendants is being made deeper and wider. What shall we do, act or theorize? Do the best we can with man as he is, or dream of ideal conditions impossible of attainment on this side of the grave?

Shall we build more hospitals, more insane asylums, more blind asylums and more penal institutions in which to house the victims of this problem while the seeds of moral suasion are being sown, cultivated and brought to full fruition in the dim future, or shall we apply the same sanitary principles which have stayed the plague, eliminated yellow fever, stopped the spread of cholera, and rendered smallpox less deadly than measles?

Shall we handle a sanitary problem by established sanitary methods or by a series of whereases and a ringing resolution?

Shall science be given a free hand, or shall the future be sacrificed to well intentioned emotionalism and hysteria?

Which shall it be?

VENEREAL DISEASES—THE RELATION OF THE PUBLIC HEALTH AUTHORITIES TO THEIR CONTROL.

Charles F. Bolduan, M. D.,
Department of Health, New York City.

Read before the General Sessions, American Public Health Association, Colorado Springs, September 11, 1913.

Students of public health have long realized that one of the important factors in the death rate is venereal infection, and that, difficult as the problem may be, efforts should be made to control the spread of these infections through administrative action. Before this audience, it is superfluous to discuss the fearful ravages caused by gonorrhœa and syphilis, throughout the civilized world. You all know the relation of syphilis to locomotor ataxia, to general paresis, and to diseases of the heart and circulatory system. You know of the countless miscarriages due to syphilis, and of the many innocent victims of prenatal infection. You also know the large number of women annually subjected to mutilating operations because of gonorrhœal infection. And yet, even though these facts have long been known, little if any effort has been made by health authorities to deal with the problem. This has been due, in the main, to the well recognized relation between the venereal diseases and prostitution, and to the feeling that this relation presented an insuperable obstacle to administrative control. In Europe especially, it was sought to combat the spread of venereal diseases by regulation of prostitution, but this mode of attack yielded only very unsatisfactory results.

Fortunately the recent advances in medical science have given us new weapons with which to attack the venereal diseases, and we are now able to approach the problem from a different angle. The beginning of the newer campaign against venereal diseases may be said to date from the brilliant discovery of the causative organism of syphilis by Schaudinn and Hoffmann in 1905. The following year brought the ingenious specific reaction devised by Wassermann whereby we are able to determine the existence of syphilitic infection, and, to cap it all, came the introduction of salvarsan by Ehrlich in 1910. It is noteworthy that, although all three of these discoveries were made in Germany, their practical application to public health work has advanced farthest in this country. This has been the case with much of the scientific work done in Germany, a fact commented upon by Koch when he visited here in 1908. Thus Loeffler introduced the culture method of diagnosing diphtheria; in this country the Department of Health of New York City at once (in 1893) made the discovery widely available by supplying physicians with culture outfits and examining the cultures in municipal and state laboratories. Koch pointed out the significance of tubercle bacilli in sputum, and the Department of Health of New York City promptly introduced (1893) the practice of making free examinations of specimens of sputum sent to the health department. When Behring discovered an antitoxin for diphtheria, the Department of Health of New York City in 1894 began to manufacture it for free distribution to the poor. The Gruber-Widal reaction of Franco-German origin was first made really practically useful to physicians by Wyatt Johnson of Montreal. Typhoid vaccination came to us from England and Germany, and our progressive health authorities have promptly introduced the procedure as one of the regular methods of typhoid control.

In sketching for you how the discoveries mentioned have given the campaign against venereal diseases new direction, I cannot do better than describe what we are doing and planning under the leadership of Dr. Hermann M. Biggs. Let me say at once that we are dealing with the matter purely as a public health problem, for, as health officials, we have nothing to do with the moral and social problems presented by prostitution.

The basis for practically all effective administrative action against infectious diseases is accurate information concerning the existence and distribution of the individual cases and this can only be obtained by some system of notification and registration. This brings us at once to a point about which there has been much controversy and much misunderstanding, and one which it will be well to examine more closely. What is the main object of notification? In the first place it is necessary to know something about the number of cases of the infection, and their distribution. In other words one object is statistical. If this were the only or even the main object, we should have little ground for insisting on notification, but such is not the case. Far more important than the statistical knowledge thus gained is the means for individualizing our efforts for securing an early and accurate diagnosis and prompt and effective treatment of the case and carrying on a really effective, educational and preventive campaign. Before going any further, let me quote the resolutions of the Board of Health of the city of New York relating to the notification of venereal diseases:

"First. That on and after May 1, 1912, the superintendents or other officers in charge of all public institutions such as hospitals, dispensaries, clinics, homes, asylums, charitable and correctional institutions, including all institutions which are supported in whole or in part by voluntary contributions, be required to report promptly the name, sex, age, nationality, race, marital state and address of every patient under observation suffering from syphilis in every stage, chancroid, or gonorrhœal infection of every kind (including gonorrhœal arthritis), stating the name, character, stage and duration of infection, the date and source of contraction of the infection, if obtainable, and

"Second. That all physicians be requested to furnish similar information concerning private patients under their care, excepting that the name and address of the patient need not be reported.

"Third. That all information and all reports, in connection with persons suffering from these diseases, shall be regarded as absolutely confidential and shall not be accessible to the public nor shall such records be deemed public records."

It will be noticed that a distinction is made between institutional cases (*i. e.*, those in the care of hospitals, dispensaries and the like), and cases under the care of private physicians. This is really based on sound public health principles for, in general, it may be assumed that the institutional cases constitute the poorer and more ignorant class, and the class most in need of close supervision. We all make practically the same distinction in our tuberculosis work and in the work against contagious diseases. A case of diphtheria or scarlet fever in a tenement house is quite a different proposition from a case in a private dwelling.

The practicability of securing notifications of venereal disease from institutions and private physicians is amply proved by our experience in New York City during the nine months from January 1 to October 1, 1913.

CASES OF VENEREAL DISEASE REPORTED FROM

INSTITUTIONS.		PRIVATE PHYSICIANS.
2311	Syphilis	5440
4467	Gonorrhœa	819
379	Chancroid	24

Of equal importance with notification and registration, is the provision by the health authorities, of facilities for the diagnosis of the infections in question. In New York City the Health Department performs, free of charge, the Wassermann reactions for syphilis, complement deviation test for gonococcus infection, and examines smears for the presence of gonococci and fresh scrapings for the presence of treponema pallida. These examinations are made only for physicians, and reports are returned only when the data necessary for the registration of the case are furnished. It is important that the transmission of specimens to the laboratory be made as convenient for physicians as possible, and in large cities this is best accomplished by establishing stations in drug stores where diagnostic outfits may be obtained, and the specimens may be left for collection by a messenger from the laboratory. In New York City there are almost 600 diagnostic stations from which specimens are collected daily, so that physicians in almost every part of the town have such a diagnostic station in their immediate neighborhood. In New York we have also established diagnostic clinics where patients may be sent to have blood specimens taken by physicians connected with the laboratory. The extent to which physicians have made use of the laboratory facilities thus placed at their disposal is shown in the following tabular summary:

SEROLOGICAL TESTS FROM JAN. 1st TO OCT. 1st, 1913.

	"Wassermann."				Gonorrhœal.			
	Positive.	Negative.	Doubtful.	Total.	Positive.	Negative.	Doubtful.	Total.
Jan.	326	474	61	861	58	93	30	181
Feb.	406	502	25	933	59	91	16	166
Mar.	454	519	49	1,022	32	58	14	104
Apr.	607	578	81	1,266	49	72	35	156
May	616	662	82	1,360	143	48	37	228
June	587	736	79	1,402	53	157	43	253
July	643	712	80	1,435	63	77	34	174
Aug.	637	787	170	1,594	60	88	62	210
Sept.	772	1,106	175	2,053	86	325	235	646
	5,048	6,076	802	11,926	603	1,009	506	2,118

Every plan of administrative control of the venereal diseases should embrace the provision of ample dispensary and hospital facilities for the treatment of cases unable to afford the services of a private physician, and these institutions should provide treatment equal to the best obtainable anywhere. In the case of syphilis this means early recognition of chancres by means of the dark field microscope and prompt and adequate treatment, including salvarsan, controlled by repeated blood examinations. In the case of gonococcus infection, it means the vaccine treatment of chronic infections also controlled by blood examinations. In both it means careful individual instruction by the clinic physician as to the nature of the disorder, as to need of proper treatment, the danger of self-medication and of quacks, and instruction in sex hygiene.

An investigation made last year showed that, with perhaps one or two exceptions, the public clinics and dispensaries in the city of New York did not *regularly* follow modern methods for the diagnosis and treatment of syphilis. Recent studies have demonstrated that early cases of syphilis, in which the diagnosis is made by the examination for treponema before the appearance of secondary symptoms, can often be cured in the course of a few months, provided proper methods of treatment are pursued. With this in mind, the board of health felt it its duty to provide means for such diagnosis and treatment, and, therefore, requested funds of the city authorities for the establishment of venereal clinics. This request was opposed by the Committee on Hospitals and Budgets of the New York Academy of Medicine on the ground that the existing clinics should be stimulated to do the work properly. The department of health acquiesced and did not press its request for funds and the Committee on Hospitals began forming an association of venereal dispensaries modeled on the line of the Associated Tuberculosis Clinics. That progress along this line is slow, is shown by the fact that at the present time, that is after the lapse of a year, in less than ten of the many dispensaries in this city, are modern methods for the diagnosis and treatment of the venereal diseases regularly followed. I feel very strongly that in cities where there are as yet no special dispensaries for the treatment of venereal diseases, it is the duty of the health authorities to provide proper facilities.

The present antagonistic attitude on the part of most hospital authorities is deplorable, and reminds one strongly of the indignant manner in which the self-righteous father-in-law, in "Damaged Goods," exclaims he never had "such a loathsome disease." Most of you are familiar with the crushing retort of the doctor: "But did you never expose yourself to infection?" It is certainly most discreditable that out of the many thousand hospital beds in the city of New York only less than two hundred are available for the care of active venereal infection. As part of the plan of administrative control in New York City we are about to erect a special pavilion for the care of venereal cases. It will form one of the group of hospitals devoted to infectious diseases, thus avoiding any stigma that may be supposed to attach to treatment in such a special hospital. It is important that the very best of hospital care and the most approved forms of treatment should be given to this class of patients.

In this connection I should like to point out that the viewpoint of the public health administrator and of the hospital authorities is widely different. The latter regard as undesirable all patients who are vicious, immoral or disobedient. Yet from the standpoint of public health this is just the class of patients who should be confined to a hospital during the period of infectivity. Certain of the hospital accommodations to be provided, therefore, should be under the control of the health authorities and conducted as a "lock-hospital" to which patients, dangerous to the public health, can be removed, by force if necessary, and retained until no longer dangerously infective.

Perhaps the most important part of the plan to control the venereal diseases consists in education and, surprising as the statement may seem, much of this must be carried on among the members of the medical profession. It is discouraging to find that much of the opposition to any effective plan for the administrative control of the venereal diseases comes from physicians. Our present experience in New York City is exactly similar to what occurred twenty years ago when steps were taken to inaugurate the administrative control of tuberculosis. The first steps in the educational campaign must consist in arousing an adequate appreciation of the importance of the problem presented by venereal infection. In this work, routine Wassermann reactions have been of great value. It may interest you to know that, through the aid of private funds kindly placed at our disposal a month ago, we have recently performed the Wassermann reaction on all patients admitted to one of the large city hospitals. In 20 per cent. of the cases the reaction was positive. There is reason to believe that there are at the present time tens of thousands of infected persons in New York City still having a positive Wassermann reaction. The vast majority of these are not under antisyphilitic treatment, and may, therefore, be regarded as candidates for late syphilitic manifestations. Will anyone here say that the medical profession at large is alive to the significance of these figures?

Prior to the introduction of the complement deviation test for diagnosis of gonococcus infections, reliance was frequently placed upon examination of smear preparations as a criterion of infectivity. Pathological investigations had gradually discredited this procedure, but most of you, I think, will be surprised at the results of some serum examinations recently undertaken among the inmates of the State Reformatory for Women at Bedford, N. Y. The character of the inmates, I might explain, is such that hardly a single one has not been infected with gonorrhœa at some time. Out of 466 cases examined, only five showed gonococci in smear preparations; nevertheless, 65 per cent. of the cases gave a positive reaction with the complement deviation test. In the light of our knowledge concerning the value of vaccine treatment, there can be doubt as to our duty in the matter.

So far as the education of the general public is concerned, it is important to secure a frank discussion of this heretofore tabooed subject. Encouraging, in this direction, is the success achieved by "Damaged Goods." Much will also be accomplished by lectures before labor organizations, women's clubs, church societies, etc., and by articles in newspapers and magazines. As already mentioned notification affords an opportunity for very direct educational work through circulars of information and the like.

One of the objections urged against the compulsory notification of venereal diseases, has been that the enforcement of this procedure would increase quackery and self-medication with patent medicines and this aspect of the problem must be borne in mind. It is obvious that the interests of the advertising quack in the prevalence of venereal diseases are directly opposed to those of the public health authorities and there is, therefore, no reason to expect any coöperation from that source. The work against venereal diseases should, therefore, embrace a thorough-going educational campaign directed against the methods of the advertising specialists. We have recently begun to insert a standing notice in the advertising columns of the several newspapers still carrying advertisements of this class of practitioner. This notice is as follows:

> FREE advice regarding venereal diseases can be obtained at the Department of Health, 149 Centre St., room No. 802, on Mondays, Wednesdays and Fridays from 2 to 4 P.M., and on Tuesdays, Thursdays and Saturdays from 9 to 11 A.M. All consultations strictly confidential.

Carrying the campaign still further into the enemy's territory we have made arrangements with retail liquor dealers for removing from the toilets of their saloons advertising notices of various genito-urinary quacks. In place of these we plan to exhibit framed printed notices identical in text with the advertisement just quoted. I have already mentioned the necessity of having a medical adviser at the special diagnostic clinics. In my opinion, this is one of the most important parts of the campaign against the venereal diseases, and the success of the work will depend largely upon the ability and tact of the medical adviser. In addition to the newspaper advertisements and the notices in the public toilets, the education of the public must be carried on by means of lectures, exhibitions, newspaper interviews, etc.

In tuberculosis, one of the most valuable administrative procedures consists in the supervision of the individual cases in their homes. While attended with many practical difficulties, there is no doubt that some form of individual supervision of the venereally infected will gradually be evolved by sanitary authorities. However, I am not now prepared to outline this part of the work.

I may sum up briefly what we may reasonably hope to accomplish by the methods above outlined, as follows:

1. To secure the early diagnosis of the venereal diseases and prompt, proper and adequate treatment. The advantages of this to the patient are so obvious that they need no further explanation.

2. As a result of early diagnosis and treatment, to reduce the risk of exposure of others and resulting infections.

3. To prevent the late manifestations of syphilis. (The rôle of the Wassermann reaction in this connection is very evident.)

4. Through education and through suitable marriage regulations to prevent the infection of the innocent.

5. To increase the hospital facilities for the care of venereal diseases.

6. To secure lock-hospital facilities for the isolation of dangerously infectious cases.

7. To diffuse among the masses by means of a general educational campaign, accurate knowledge concerning sex hygiene, venereal diseases and related subjects.

Note. To his colleagues in the Health Department and especially to Dr. John S. Billings and Dr. Archibald McNeil the writer extends his thanks for material used in the preparation of this article.

THE MINERAL CONSTITUENTS OF THE SO-CALLED ALKALI WATERS IN NORTH DAKOTA.

Gustav F. Ruediger, M.D.,
Director of the State Public Health Laboratory, University of North Dakota, Grand Forks, N. D.

The state of North Dakota has perhaps a somewhat unenviable reputation on account of the hardness and other undesirable qualities of her groundwaters that are sometimes served to the traveler and newcomer. Some of these waters are so hard that it is entirely impossible to produce a lather when washing or bathing, and others are so irritating to the intestinal tract that they produce violent intestinal disturbances in those who are not accustomed to them. Many waters are unpalatable on account of the large amount of "alkali" that they are said to contain. Some apparently are unwholesome for stock and especially for horses and we are frequently called upon to make analyses of samples of water to determine whether or not they are suitable for watering stock. As there are practically no data on these points in the text-books and as many of these waters contain such an unusual amount of mineral matter, I have found it exceedingly difficult to draw correct conclusions from the results of our analyses. Doctor Harrington* in his excellent text on hygiene makes the statement that a water is unsuited for domestic uses if it has a permanent hardness greater than 50 parts per million and a mineral residue greater than 500 parts per million. The State Geological Survey of Iowa in making its water survey says that any water containing less than 2,000 parts per million of solids in solution is suitable for drinking purposes. When we look over our analyses, we find that there are very few waters in North Dakota that could be passed if we considered a mineral residue of 500 parts per million excessive. There are, in fact, very few groundwaters in our state which have less than 500 parts per million of solids in solution.

It is difficult at times to decide whether or not a water giving a mineral residue of 2,000 to 2,500 parts per million should be advised against or not. We find sections of the state where these waters are used without noticeable ill effects, and it seems absurd, therefore, to tell the people that the water which they have been using for years is not fit to drink.

When I came to the state of North Dakota, I was told a great deal about the "alkali" water and I was led to believe that the irritating effects on the intestinal tract were due to the presence of carbonates and bicarbonates of sodium and potassium. I was led to believe that these waters actually had a very high alkalinity due to the presence of carbonates and bicarbonates of these alkali metals. I soon discovered. however, that the people in certain parts of the state were drinking water that had an alkalinity of 900 to 1,200 parts per million, due to the presence of these alkali carbonates and bicarbonates, and none had ever experienced any ill effects. An analysis of one of these waters, which is used for a public supply, gives the following results:

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* Practical Hygiene, 3d edition, p. 331.

	Parts per million.
Total alkalinity	980
Alkalinity after boiling and filtering	865
Total mineral residue	1,400
Total hardness	115
Temporary hardness	115
Permanent hardness	0
Calcium	38.8
Magnesium	4.3
Chlorine	150
Sulphates (as SO_4)	137.4
Nitrogen as	
Free ammonia	.000
Albuminoid ammonia	.040
Nitrates	.020
Nitrites	.100

I found further that the waters which the residents call "alkali waters," as a rule do not have a high alkalinity. In the same city block, we frequently find wells containing "alkali" water and others containing water which is considered very good for drinking. In making studies of the mineral constituents of these waters, we found that the so-called "alkali waters" in these wells often have a lower alkalinity than the water in the neighboring well which is considered good for drinking. The analyses almost invariably showed, however, that the total solids in the so-called "alkali waters" are very high and that these solids are made up in large part of magnesium sulphate. This is shown very clearly by comparing our analytical data of the two samples marked "McE." and "Dr. J. W." These two wells are less than three blocks apart and are both shallow wells, about fifteen feet in depth. The analyses give the results shown in Table I.

Another interesting comparison of two wells in close proximity to each other is afforded by the analyses shown in Table II.

I next undertook to make a closer study of these mineral constituents with a view of determining which of the particular substances in these waters is injurious. An analyst would hardly recommend a water for drinking purposes when it has over 4,500 parts per million of solids in solution and yet it seemed exceedingly interesting to inquire why some waters with high solids are injurious, whereas others with nearly as high a content of mineral matter are found not injurious and are even quite palatable. If, for instance, we compare the results of the analyses of the following three samples, we find that the total solids in each are above 3,000

TABLE I.

	Parts per million.	
	McE. (bad.)	Dr. J. W. (good).
Total alkalinity	290	360
Total mineral residue	4590	684
Total hardness	1400	477
Temporary hardness	250	290
Permanent hardness	1150	187
Calcium	164.12	99.83
Magnesium	236.88	55.16
Sulphates	614.4	211.2
Chlorine	200	20
Nitrogen as		
Free ammonia	.000	.004
Albuminoid ammonia	.060	.144
Nitrates	32	3
Nitrites	.050	.010

TABLE II.

	Parts per million.	
	Walhood well, 35 feet. (good).	Kloster well, 35 feet. (bad).
Total alkalinity	395	410
Total mineral residue	1860	3580
Total hardness	640	1880
Temporary hardness	345	345
Permanent hardness	295	1535
Calcium	162.4	333.6
Magnesium	56.16	251.04
Sulphates	807.2	978.2
Chlorine	65	95
Nitrogen as		
Free ammonia	.080	.000
Albuminoid ammonia	.120	.000
Nitrates	19	3
Nitrites	.010	.010

and yet the first and second samples are used for drinking purposes and are considered fairly palatable, whereas the third sample in the column is absolutely unfit for drinking because it is unpalatable, has a strong cathartic action and is irritating to the intestinal tract. The analytical data of these three waters are as follows (Table III):

TABLE III.

	Parts per million.		
	Artesian well 690 feet (usable).	Drilled well, 90 feet. (usable).	Bored well, 35 feet (bad).
Total alkalinity	450	420	530
Total mineral residue	3210	3220	3940
Total hardness	173.85	950	2390
Temporary hardness	90	360	450
Permanent hardness	83.85	590	1940
Calcium	19.07	544.27	229
Magnesium	30.28	177.6	436.2
Sulphates	470.4	470.4	1344
Chlorine	600	170	145
Nitrogen as			
Free ammonia	1.350	.000	.140
Albuminoid ammonia	.190	.000	.300
Nitrates	.000	.500	30
Nitrites	.000	.020	.450

These analyses show that all three samples have a mineral residue greater than 3,000 parts per million, and by most analysts would be pronounced unsuited for drinking purposes. We find, however, that samples No. 1 and No. 2 are used for public supplies in small towns. Everybody drinks them and considers them fairly palatable although the first one has what is generally termed a "mineral" taste. In making a further comparison of these three samples, we find that the chief difference lies in the content of magnesium and in the sulphates. Sample No. 3 is exceedingly high in magnesium and in sulphates and has a distinctly bitter taste like magnesium sulphate. The magnesium in sample No. 2 also is relatively high but apparently not high enough to bring about a cathartic action and give the water a disagreeable taste.

I believe I can safely conclude, therefore, that a water should be considered unsuited for drinking if it contains over 200 parts per million of magnesium which is present largely in the form of magnesium sulphate. But I must mention in this connection that some of the waters in our state are unpalatable and have a cathartic action due to the presence of large amounts of sodium sulphate. For instance, one of the waters which we have just considered (drilled well, 90 feet) was used by a large number of people for drinking purposes and was not found objectionable although the analysis showed 177.6 parts per million of magnesium. In another instance I found a water with a smaller mineral residue than the one just mentioned and exactly the same amount of magnesium, that is, 177.6 parts per million, and yet this water could not be used for drinking (sample "McK." below). It was both unpalatable and irritating to the intestinal tract. In a neighboring well with about the same amount of total residue was found a water that was carried for many blocks by the residents of the village because it was considered a very good drinking water. I was rather surprised when I made a comparison of the two last mentioned analyses because they were so nearly alike, as is shown in Table IV.

TABLE IV.

	Parts per million.	
	McK. (bad).	P. O. (good.)
Total alkalinity	320	380
Total residue	2870	2724
Total hardness	1175	1003
Temporary hardness	217	205
Permanent hardness	958	738
Calcium	174	220.4
Magnesium	177.6	108.4
Sulphates	1737	1569
Chlorine	282	183
Nitrogen as		
Free ammonia	.030	.024
Albuminoid ammonia	.114	.098
Nirates	1.12	12
Nitrates	.0001	.0002

I would naturally consider both of these waters undesirable for drinking purposes and I must say there is not very much difference from the chemical point of view. I found, however, that the water from one well was carried for many blocks, whereas, the water in the other well was not used by those living on the lot where the well had been dug. In the water that is considered bad, the magnesium is considerably higher than in the other and the sulphates also are somewhat higher. Our analyses were not complete enough to determine how much sodium sulphate there was but it would seem that both contain a considerable amount of it, because the sulphate radical is too high to combine with the calcium and the magnesium: and that sample "McK." contains more of this salt than sample "P. O."

I am satisfied, however, that in this water, as in the others, it is the magnesium and the sulphate radical that are the objectionable constituents.

It may be interesting in this connection to refer to two of the worst waters which we have found in our survey up to date. I will give the following analytical data without much comment:

TABLE V.

	Parts per million.	
	Dr. H.	J.
Total alkalinity	435	590
Total residue	5440	11346
Total hardness	2855	4267
Temporary hardness	400	540
Permanent hardness	2455	3727
Calcium	376.8	443
Magnesium	459.1	766
Sulphates	1920	3235.2
Chlorine	87.5	47.5
Nitrogen as		
Free ammonia	.002	0
Albuminoid ammonia	.260	.120
Nitrates	.80	.750
Nitrites	0	.450

These waters were used for watering stock but not for drinking and cooking purposes. One of my assistants, out of curiosity, took several swallows of sample "J" and was ill for two days as a result. It not only had a cathartic action but produced nausea and vomiting and intense abdominal pains. I was not able to ascertain what effect this water has on the stock.

THE PROBLEM OF THE INSTITUTIONAL INFANT.

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Read before the English-Speaking Conference on Infant Mortality, London, England, August 4, 1913.

The problem of the institutional infant is a most complex one and unfortunately it is no nearer solution than it was years ago. There are fifteen institutions in New York state devoted exclusively to the care of young infants. These institutions are required by law to be regularly inspected by the State Board of Charities, with which are filed all reports of admissions, deaths, and discharges. In 1902 there were 3,394 infants admitted to these institutions, of which number 1,148 died, and in 1912 4,130 were admitted and 1,871 died under one year of age. The mortality in ratio to the number of infants admitted has averaged 38 per cent. for the past ten years. The number of deaths among infants in institutions, therefore, has varied but little during the past ten years, while the general infant mortality in New York state has been materially reduced. For example, in the year 1904 the number of deaths under one year to 1,000 living births was 151, or 15 1-10 per cent., while in 1912 there were 108 deaths under one year to 1,000 living births, or a mortality of 10 8-10 per cent. Outside of institutions a greater number of infants' lives are being saved each year by improved methods of feeding and care, and by the instruction and education of the mothers in matters of infant welfare. In the institutions for infants, where the construction, hygienic conditions, air space, milk supply, and trained oversight are vastly better than in the majority of homes, the mortality is approximately four times as great and does not show any signs of diminishing. A comparison of the number of deaths among the home babies and the institutional babies is, nevertheless, both misleading and unfair. Infant mortality as generally accepted is the number of deaths under one year of age to one thousand living births. This definition is not applicable to institutions where the death rate is computed by the ratio between the number of deaths and the number of infants admitted, or under treatment. There is a further source of error in some reports, where the babies who survive more than one year are included each year in the total on which the mortality rate is reckoned, while the deaths are counted but once.

After considerable correspondence and study of institutional reports, the fact is undeniable that the statistics on the subject of infant mortality in institutions in the United States are extremely unsatisfactory. There is no uniformity in the published statistics and one cannot make any comparisons that are worthy of consideration.

Many of the infants brought to infant asylums or hospitals are in poor and feeble physical condition, and while many of the deaths no doubt are preventable, still a large proportion of them are inevitable.

A closer analysis of the institutions for infants in New York state shows that they can be divided into two distinct types—one an asylum which only provides hospital care for such babies as may be ill, the other an infants' hospital, established and maintained for the sole purpose of treating sick babies and discharging them when well. The first type of institution has been in existence for centuries and the mortality in them has always been high. The foundling, the illegitimate, the deserted, and the orphan baby form the majority of the inmates, and it is in the strict sense of the word "an asylum." The second type is the modern institution and is a babies' hospital. It is not a home for the homeless and deserted baby but a hospital for those in actual need of medical or surgical treatment.

There is an increasing tendency to find fostermothers to nurse and to care for babies of the asylum type. The mother of the illegitimate child should be compelled to keep and to nurse her own baby, and mother and infant should never be separated except for urgent and compelling reasons. When necessary, pensions should be granted by the municipality to the mother rather than to pay the board of the baby in an institution. This is successfully accomplished in several European cities. The following extract from the 1912 Report of the New York State Board of Charities is worthy of attention in this connection: "It is a short-sighted policy that authorizes the payment to private charitable institutions of from $2 to $3 a week for each child of a good mother, when that sum or in some cases even less would have enabled such mother to maintain her home and to keep her family together. This is especially true in cases where, on the death or incapacity of a father, three or more children have been committed to institutions at public expense, and the mother left to make her own living. The result of this policy is to break up the family ties and in many cases to expend a larger sum of money for the maintenance of the children in institutions than would have been necessary to aid the mother in maintaining her family in her own home for what would probably be a shorter period."

We of the new world cannot look back through the centuries to trace the evolution in the institutional care of infants, still we can point with some degree of pride to the following rule adopted by the Common Council of the city of New York in 1800: "Care should be taken to provide health and proper (wet) nurses for such of the infants as may require them and where this can be done outside of the almshouse it shall be preferred." The records show that there were 129 infants placed out "at nurse" and paid for by the state at the rate of $1 a week. Some years later infants' asylums were established and as the infant mortality grew to alarming and distressing porportions, the placing out system again came into favor.

The New York Foundling Asylum is one of several institutions in that city which makes a practice of placing out the babies in homes where the mothers can nurse them. In the year 1912, 384 babies, under one year of age, were boarded out by this asylum and of this number 308 were wet-nursed and seventy-six bottle fed. These foster-mothers and their homes are regularly inspected by physicians and nurses from the asylum and the mothers receive $10 a month for the care of each baby. If a baby becomes ill, it is returned to the asylum and of 170 sick children so returned there were ninety-three deaths last year and nine deaths in the homes of the foster-parents. If the mortality of this asylum were computed on the number of deaths and the number of infants in the institution, it would be entirely misleading and a gross injustice to the institution.

Institutions for infants are necessary, but let us avoid the term asylum and all that it implies, and use, in preference, that of homes or infant hospitals.

Every baby under one year of age requires individual care, nursing, and attention to diet and is almost as much care as the sick baby and should be considered a hospital case. To illustrate, I would like to describe the evolution of an institution with which I have the honor of being connected in Albany, N. Y., a city of about one hundred thousand inhabitants.

This institution was started as a foundling hospital in 1883 and was called St. Margaret's House. A study of over 2,500 infants which have been received since the institution was established shows that less than 2 per cent. were foundlings, but that the number of illegitimate babies outnumbered the legitimate by more than two to one. The mortality as compared with the admissions from 1883 to 1901 showed that it ranged from 36 to 81 per cent. with an average of 38 per cent. In 1901 this institution was changed into a babies' hospital and the name incorporated as St. Margaret's House and Hospital for Infants. During this period there has been a marked increase in the number of sick babies sent by their parents for active medical treatment, and notwithstanding the fact that sick babies were admitted, the mortality has ranged from 10 to 25 per cent. with an average of 16 per cent. This lessened mortality has been coincident with placing the institution on a hospital basis, closer medical and nursing care of the babies, and the establishment of a training school for nursery maids. Under this arrangement there is one nurse to care for every four babies, which insures more individual care and personal attention to the babies. These nurse maids become very fond of their little charges and the babies receive a certain amount of affection and care, which is best expressed by the term "mothering," and this is encouraged.

Dr. Holt, in his presidential address last year before the American Association for the Study and Prevention of Infant Mortality, laid great emphasis on the educational value of the babies' hospital. He pointed out the fact that these hospitals do much more for the community than care for the sick poor. They instruct the medical profession and offer exceptional opportunity for the study and prevention of diseases in infants. Nurses and nursery maids are given first-hand knowledge of many things relating to the care and feeding of infants, so that they can more intelligently impart this knowledge to ignorant mothers.

The solution to the problem of the institutional infant is to do away with the term infant asylum. The foundling and motherless baby should be provided with a suitable home with wet-nursing, and the mother and her own infant should never be separated.

Infants' hospitals should be established in every community to provide for the babies requiring medical and surgical care. Such babies do much better and are more intelligently cared for in hospitals designed and adapted for the care of young infants. The babies' ward in the general hospital or in a children's hospital is not so productive of good results.

HEALTH DEPARTMENT REPORTS AND NOTES.

TO STATE AND MUNICIPAL HEALTH OFFICERS.

This new division of the Journal is specially designed to be of use to active Health Officers of the countries represented in the American Public Health Association. It will be unable to serve its true function unless the Health Officers are willing to coöperate by sending to the Journal copies of their reports, bulletins, new ordinances and personal information which will be of general interest. Furthermore it would be distinctly desirable if communications on subjects of general interest are submitted for publication in this division of the Journal. The management will further welcome any suggestions from Health Officers for the improvement of this division. All communications should be addressed to Selskar M. Gunn, Managing Editor, American Journal of Public Health, 755 Boylston St., Boston, Mass.

REPORTS.

St. Paul, Minnesota.

Dr. Howard Lankester, commissioner of Health, presents the report of the St. Paul Department of Health for the year ending December 31, 1912. St. Paul claims the title of "The Healthiest City in America," and Dr. Lankester points out a reduction in the city death rate from 10.88 in 1910 to 9.81 in 1912 in spite of the fact that the rate is based on the 1910 census population, although the city has been steadily growing. Perhaps the best showing is made among the contagious diseases; a total of 4,107 cases being reported for scarlet fever, measles, diphtheria, and typhoid in 1910, while only 978 cases of the same diseases are recorded in 1912. Smallpox, however, shows a gain from 170 cases in 1910 to 634 in 1912 on account of a rather extensive epidemic which developed in the fall of 1911 and continued into 1912.

The report of vital statistics follows the Bertillon system and the whole report has a neat and business-like appearance, indicating good organization. The reports of the assistant commissioner and of the inspectors of dairies, hotels, smoke nuisance, barber shops, etc., are made over the signature of the person reporting and are brief, business-like and, in general, indicative of enterprise and efficiency. The hospitalization of smallpox cases has recently been supplanted by house quarantine with apparently beneficial results. The milk inspector asks for laws which shall require all milk to be refrigerated during transportation, that all milk for retail purposes shall be delivered in bottles, and that all barns where tubercular cattle are found should be whitewashed and disinfected. The live stock inspector reports glanders reduced to a minimum as a result of the abolishment of drinking troughs and the consequent necessity of carrying individual water pails for the horses. He asks for an ordinance which shall require the muzzling of all dogs for one year in order that rabies may be decreased. The superintendent of garbage collection points out the increasing difficulty of disposing of all garbage to farmers for hog-feeding and fertilizer and asks that the possibility of a municipal disposal plant be investigated at once. The smoke inspector has spent part of his time in the instruction of firemen, and his work has been seconded by the railroads which have employed trained men to educate their firemen. He puts forward electrification as the only final solution of the problem.

The report in general tells of work done and results accomplished but faces the defects and exisitng evils bravely and proposes well considered remedies for the consideration of the mayor and council not to mention the people.

La Crosse, Wisconsin.

The Health Department of La Crosse, a city with an estimated population of 30,500, presents its second annual report. While the report is a modest affair of only thirteen pages it is commendable in contrast to the many other western cities of the same size which publish no report whatever.

The board of health points with pride to the reduction of the number of cases of communicable diseases from 332 in 1911 to 216 in 1912, attributing it to prompt and well-organized action in three prospective epidemics. For several years the large percentage of unvaccinated children in the schools had given rise to the fear of a serious outbreak of smallpox and this seemed imminent just before the Christmas holidays. Prompt enforcement of the state vaccination law during the holidays permitted the schools to be opened on time and not a single additional case was reported among school children although eight cases resulted among adults. A threatened epidemic of diphtheria in the rubber mills was stopped by taking cultures from the 300 employees and isolating six carriers which were found to be spreading the disease. A reduction in the diphtheria death rate has been brought about by the department's handling its own antitoxin and selling it at cost price which has led to increased use as well as a saving in money.

The report of vital statistics is a modification of the Bertillon system and would be improved by following it exactly, although the small population is an extenuating factor. The death rate for residents is 9.3 for 1912.

Salt Lake City, Utah.

The Health Department of Salt Lake City issues an exceptionally good report for the year 1912. With the introduction of the commission form of government at the beginning of the year came a reorganization of the department which was placed under the mayor, who also acted as Commissioner of Public Safety. It was then divided into the following seven divisions: Health, Bacteriology, Sanitary Inspection, Milk and Dairy Inspection, Meat and Food Inspection, Weights and Measures, and Chemistry. By this method the conflicts in authority which had previously frequently occurred were avoided and this work has gone smoothly and, apparently efficiently.

The report has an attractive appearance and is rendered more readable by the use of subheadings in black-face type throughout the text. The city has a population of 95,000 and a total death rate of 12.36, and a birth rate of 26.87. The expenditure through the Health Department was seventy cents per capita for the year.

The transmissible diseases are reported for the year by months and wards and for the past five years by months. The table of causes of death, however, gives only the totals for the year and should be remodeled. The reports of the separate divisions are well written and give the impression of up-to-date and thorough work. The division of Milk and Dairy Inspection has brought about an improvement in the milk supply by publishing the results of chemical and bacteriological analyses. During the present year the standards of grading suggested by the New York Milk Committee will be adopted and it is hoped that automobiles or motorcycles may be purchased to facilitate the collection of samples. An improvement in the condition of milk bottles returned by consumers to dealers by furnishing the dairymen with gummed labels, each of which bore the section of the city ordinance providing for the washing of bottles. One of these was stuck on each bottle sent out on a certain day.

Among the recommendations for improvements to be made are the following: the installation of school nurses and district nurses, a smaller and more convenient isolation hospital, a state tuberculosis sanitarium, an emergency hospital, and more frequent garbage collection.

Columbus, Ohio.

The 1912 annual report of the Board of Health of Columbus, Ohio, shows a death rate of 14.36, based on a population estimated from the 1910 census at 194,023. Excluding non-residents the rate is reduced to 12.36. The birth rate—14.81— is probably lower than it should be on account of a decision of the Supreme Court which held that under the existing law physicians and midwives could not be compelled to render detailed reports of births without compensation. It is expected that this law will be amended in the near future.

The report of vital statistics is unusually complete and shows one notable improvement over the majority of reports in that it gives statements of disease incidence and mortality for previous years in such a form that they may readily be compared with 1912.

The typhoid rate is higher than for any year since the epidemic of 1908, the unusual increase being due to an outbreak in August and September in which 178 of the year's 272 cases occurred. The origin of the cases was not definitely traced to any one source but it was found that 85 per cent. of the individuals affected had either visited out of the city or were users of well water. The number of cases of diphtheria and scarlet fever has nearly doubled each year since 1910 and one of the greatest needs of the city at the present time is an isolation hospital for contagious diseases. Tuberculosis in the same period shows a noticeable decrease in its death rate.

Meat inspection was undertaken by the city during the past year with satisfactory results and dairy inspection has been made more strict. Other branches of sanitary inspection appear to be efficiently handled.

DEPARTMENT NOTES.

Popularizing Preventive Medicine.

" 'Preventive medicine' is defined in dictionaries as 'that branch of medical science which aims to prevent or ward off disease by properly directed hygiene, personal and public.' Hygiene is defined as 'the science that treats of the laws of health in its broadest sense.' These are vague definitions, but until recent years they were justified by the vagueness of the subjects they sought to define. Applied preventive medicine and hygiene are almost wholly a twentieth century product, and the twentieth century is only twelve—'going on thirteen'—years of age. It is a wise provision of nature that mountain climbers get out of breath, for in stopping to regain their breath, they get their minds off the immediate obstacles to the next step, and their horizon broadens out from the immediate environment of their feet, and they see the splendid view below them as well as the inspiring unexplored heights above It is so in preventive medicine. Already the backward look over the past twelve years presents a wonderful advance, and promises great advances for the future. The results to be achieved in the prevention of disease so largely depend upon the individual coöperation of the citizens that popular education must be one of the chief factors in progress. One of the significant movements of the past five years has been the establishment of welfare departments of industrial enterprises. Competent medical officers are in charge of these departments and are equipped with facilities for examining and advising employees. They also are instructed to prepare and issue brief practical leaflets upon foods, room ventilation, clothing, sleeping porches, and all the various subjects of personal hygiene.

"One insurance company that has taken up this work in a most admirable way, provides the option of a free physical and medical examination of its policy holders every two years. This company also maintains a 'Health and Happiness League,' the members of which are the wives of policyholders. The certificate of membership contains the following:

"'..................having promised that she will do all in her power to help the...... ....to improve the health of its policy holders, and that she will do all in her power to preserve her own bodily health and add to the happiness of others, is hereby declared a member..................

"The literature sent to these members is accurate, interesting, well illustrated, and covers everything about the home related to health, from the baby to the Sunday afternoon outing. All this has been established in the line of good business policy. It pays to keep policyholders well and happy; they live longer, and have money to pay premiums; more premiums mean a larger volume of business each year. The success of this policy has appealed to many corporations, which have need for healthy, happy employees.

"The influence of such educational work cannot be overestimated in promoting the health conservation movement. But the attention of the owners and managers of these corporations should be drawn to the fact that the best results of their outlay in this direction will be attained only by supplementing it by the organization of strong sanitary public health service. The promise of the member of the insurance company's league was to 'do all in her power to help . . . improve the health' of her husband and family and 'to preserve her own bodily health.' It is *not in her power* to do those things for which the public health departments are created."

Bulletin of the California Board of Health May, 1913.

The Necessity for the Sanitation of Schools.

"In one of our previous bulletins we gave special consideration to the faulty construction, equipment and arrangement existing in our school buildings, particularly in the rural school districts.

"Now is the time to give these conditions serious consideration and *action.* Local boards of health should make systematic surveys of school building and school ground conditions in their jurisdictions and furnish written recommendations to local boards of education. This should be done now so as to get the work necessary to correct conditions done before the next school year.

"The *American School Board Journal* of July gives prominent emphasis to the statement, 'The requirements of *safety* and *healthfulness* are *paramount* to the educational value of every detail of school house construction and to every pedagogic advantage of school furniture and equipment.' This is certainly sound educational doctrine and good pedagogy. We wish that every board of education might realize its importance. The expenditure of twenty-five dollars to render the school water supply safe is more creditable than the purchase of a beautiful, nickel plated miniature of the solar system.

"When we consider seriously *the fact* that during a period of years of all school teachers who died in Michigan at ages between twenty-five and thirty-five years, *over fifty-two per cent* died of tuberculosis, while of all people in the state who died within those age limits, *less than twenty-six per cent* died of tuberculosis we must be inclined to give this subject more than passing comment. It demands action and now during the vacation months is the time to get busy on this proposition.

"This department will be glad to assist local boards of health to the end that correct realization of the insanitary and unhealthful conditions may be appreciated and remedied."

Public Health Michigan, June, 1913.

Methods of Reducing New York's Infant Mortality.

"At each of the fifty-five milk stations a nurse is on duty all the time and a doctor is on duty two days each week. On May 1 an additional nurse was assigned to each station for the extra work of the summer months. The milk stations are being developed constantly toward the ideal of educational centres, and breast feeding is particularly encouraged as far as possible. The number of mothers who now come to the stations in order to obtain milk for themselves, so that they may nurse their babies, is encouragingly large.

"In the beginning of July all nurses who had been doing school work were assigned to duty in the instruction of mothers. Each nurse has 150 babies to take care of and works in a district which is not already covered by the activities radiating from an infants' milk station. This custom has been followed for the past two years with great success, the nurse visiting the baby as soon as possible after it is born and keeping it under continued observation during the hot weather. Every morning each group of two or three nurses meets with the department physician and consults with him regarding delicate or sick babies. If a child is not normal, the medical inspector visits it himself and refers the family to the proper dispensary or hospital to have the baby treated, if necessary. In 1912, 38,000 babies were treated and 1,600,000 quarts of milk were dispensed at these stations.

"The usual splendid coöperation of private agencies has been given again this year. About 80 different agencies are now federated in the Babies' Welfare Association, with its central clearing house for information and publicity at the headquarters of the Department of Health."

Bulletin of the Department of Health of New York City, August 2, 1913.

Whooping-Cough Mortality.

"Statistics regarding the fatal cases of whooping-cough, compared with the mortality of scarletina, measles and diphtheria, show the startling fact that the first-named disease twenty years ago was more dangerous than even scarlet fever, and that now it still is worse than diphtheria. The following figures are taken from the official report of the Austrian Board of Health and published by Dr. Langer in the *Oesterreichisches Sanitätswesen* for 1913, No. 21.

REPORTED FATAL CASES IN AUSTRIA.

Year.	Whooping-Cough.	Scarletina.
1890	27,274	12,158
1908	8,714	14,366
Year.	Measles.	Diphtheria.
1890	15,182	28,514
1908	7,929	7,924

"In these figures, the numerous deaths due to complications of whooping-cough are not considered. Special attention should, therefore, be paid to this dangerous disease, as not so much change of air as pure air alone is necessary for the cure of the attacks."

Vienna Letter, J. A. M. A., August 23, 1913.

Team Work.

"Great good is now being accomplished in Louisville in caring for the worthy poor, preventing the spread of disease and looking after the insanitary conditions through well-organized team work.

"This team is composed of the City Health Department, the Associated Charities, the Babies' Milk Fund, the King's Daughters, the School Physicians and School Nurses, the Obstetrical Dispensary for the Poor, and the Louisville Anti-Tuberculosis Association.

"Five of these organizations, namely, the Associated Charities, the Babies' Milk Fund, the King's Daughters, the School Nurses and the Obstetrical Dispensary for the Poor, are all housed under the roof of the Charities Building at 215 East Walnut Street. They all have their chiefs, their assistants, their telephones and their card systems for keeping records. They consult together and plan their work so there is coöperation in all departments and no overlapping. Through this checking up system, imposition on charity is prevented and intelligent relief afforded in all cases. The Associated Charities, through intelligent, competent and experienced visitors, finds out the true financial condition of all who are reported in need, and makes a record of the case. If it is a case of want of food, heat or raiment, the Associated Charities sees to it that relief is given; if it is a case of tuberculosis, the Anti-Tuberculosis Association takes charge of it; if it is a sick baby, it goes to the Babies' Milk Fund;

if it is a sick child, the school nurse comes in; if it is a case that requires special nursing, the King's Daughters step to the front and supply the need; if it is a case of bad ventilation about houses or insanitary conditions, the Department of Health sends an inspector, who sees that it is set right; if it is a case of child birth, the Obstetrical Dispensary takes charge. There is no waste of time, energy or money. The team works as a unit, and it is a source of delight to all who have the milk of human kindness in their breasts to see the results obtained."

Louisville, (Ky.) *Monthly Bulletin of the Department of Health,* September 1, 1913.

New York Milk Rules.

At a meeting of the Board of Health of the Department of Health, held July 30, 1913, the following rules and regulations for the sale of dipped milk and cream in stores in the City of New York were adopted, to take effect on and after August 26, 1913:

1. Milk or cream shall not be stored, handled or sold in any stable, or in any room used for cooking or domestic purposes, or in any room which communicates directly with any such stable or room, or in any room in which there is a water closet apartment or with which a water closet apartment communicates, unless such apartment be enclosed by a vestibule, and both apartment and vestibule be properly ventilated to the external air.

2. The term "domestic purposes" shall be held to apply to rooms used for sleeping purposes or for cooking purposes other than the preparation of the midday meal.

3. Milk or cream shall not be handled or sold in any room which is unduly crowded.

4. Milk or cream shall not be dipped from cans stored in a room in which butter or cheese is manufactured.

5. Milk or cream may be stored in a cooling or refrigerating room, or ice chest, the construction of which has been approved by the department.

6. No milk or cream shall be dipped from cans stored in a milk booth.

7. Milk shall be kept at a temperature of 50 degrees Fahrenheit or below at all times.

EQUIPMENT.

1. Rooms in which milk or cream is handled or sold shall be well lighted.

2. The floors, walls and ceilings shall be smooth, and must be kept clean and sanitary.

3. All windows and doors shall be properly screened.

4. An adequate supply of hot water shall be provided for the washing of utensils.

5. A sufficient number of properly constructed ice tubs, or other adequate refrigerating facilities, for cans of milk or cream shall be provided.

6. All utensils used for dipped milk or cream shall be of the seamless sanitary type, heavily tinned.

METHODS.

1. No milk or cream shall be dipped from cans stored in any room in which rubbish or dirty material is allowed to accumulate, or in which there are offensive odors.

2. All cans or other receptacles used for milk or cream shall be cleaned thoroughly upon emptying.

3. The cans from which milk or cream is dipped shall be packed in ice, and shall be kept covered at all times, except when the milk or cream is being actually dipped therefrom.

4. After each day's use all utensils shall be thoroughly cleaned with hot water and soda, and then with boiling water.

5. All utensils used for dipped milk or cream shall be kept clean.

6. The ice tubs in which milk or cream is stored shall be painted inside and outside, and shall be kept clean at all times.

7. A separate dipper shall be provided for each can from which the supply is being served, and such dipper shall remain in the can between dippings until all the milk in the can has been disposed of.

8. All goods sold in milk stores must be either in unbroken packages, or must be so placed, protected and handled that no dust or odors therefrom can injuriously affect the milk.

9. Dry sweeping and dusting in rooms in which milk or cream is dispensed is prohibited.

10. The tags on cans of milk or cream must be kept on file in the store for at least two

months for inspection by the Department of Health.

11. The attendants shall wear clean, washable outer clothing.

12. Only such persons shall be employed as are free from infectious diseases which may be transmitted in the handling of milk.

Weekly Bulletin of the New York City Department of Health, August 30, 1913.

Sanitary Soda Fountains.

"A large amount of disease is contracted at the soda fountain. Small amounts of the saliva of those using the glasses remain on the glasses, and before the washing water is changed it becomes, to variable degrees, adulterated with ordinary spit. It is known that the germs of tuberculosis and the infective agents of measles, whooping-cough, scarlet fever, diphtheria, and occasionally typhoid fever, are carried in the mouth secretions. The soda fountain, as it is ordinarily managed, has for a long time been a source of annoyance to sanitarians. At last, however, it seems that the problem of operating a sanitary soda fountain is solved.

"Paper paraffin cups and saucers are now being manufactured and put on the market for a little more than half a cent apiece. These cups in the process of manufacturing are dipped into melted paraffin and are practically sterile; they are put up in stacks, and in using them at the fountain the clerks do not touch the inside of the cup, or the upper third of it. Customers that are served with the sanitary cup drink out of a cup that no one has used, and that has not been touched with human hands or lips. The spoons that are used with the ice cream are dipped into an antiseptic solution before being served to customers. Fountains using these sanitary appliances do not spread disease. The patrons of soda fountains should patronize those fountains that go to a slight expense in giving the public clean, harmless drinks; this will encourage the more general use of the sanitary cup."

Bulletin of the North Carolina Board of Health, August, 1913.

Tuberculosis from Brushing Clothes.

An interesting series of experiments has been performed in France, showing that dried sputum may not be so innocent as we have of late been led to suppose. Clothes soiled with dried tuberculosis sputum were brushed in such a way that guinea-pigs inhaled the dust. Clothes having sputum from two to four days' old infected all guinea-pigs, but in proportion to the length of time over four days the infectiousness diminished, though one pig was infected from sputum dust that had been drying on the cloth for sixteen days."

Life and Health, September, 1913.

Industrial Hygiene.

"Efficiency is the paramount factor in modern industry. Efficiency embraces not only modern buildings and equipment, but also takes into consideration the human element—the workman. This last force—conservation of the living machine—is not infrequently neglected in the theory of scientific management.

"Imperfect ventilation, a close muggy atmosphere surcharged with noxious odors and an excessive amount of CO_2 strikingly affect the tone of the human body and promote inefficiency.

"The human body requires water and plenty of it to carry off the body's waste product. Absorption of the toxins within the body promote headache, lassitude and an inaptitude for work. We note with pleasure the abolition of the public drinking cup and the institution of sanitary drinking fountains in many workshops and factories.

"The protection of the workman from harmful dusts, the prevention of industrial accidents and poisoning, the correction of faulty conditions which give rise to eye fatigue and strain, are bound to result in increased efficiency.

"Foremen are employed to inspect machines, to replace work parts or regulate the speed, but as a rule there is no one to care for the men who run the machines.

"Perhaps the time is not far distant when the manufacturer seeking the highest efficiency will not be content with shop sanitation, but will find it to his advantage to provide systematic medical inspection of his employees and the conditions under which they live, with the object of preventing illness in the individual and the spread of disease in the shop.

"Compulsory compensation to victims of industrial accidents is an argument in favor of medical inspection. 'Would it not pay the employer to know what physical defects in the employee may contribute to an accident and thus take measures to prevent the same?' Would it not save the legal expense of contesting some law suits?

"Human waste means idle machines, 'green men' with subsequent lost time in supervision.

"The employment of a man who is both a physician and hy ienist is not only humane 'but in certain places it has proved so advantageous to the employer as to be justified on broad business grounds.' In these places the doctor has been supplemented by that of a nurse with excellent results."

Weekly Bulletin of the Board of Health of Cincinnati, Ohio, August 16, 1913.

The London Conference on Infant Mortality.

At the instance of the British National Association for the Prevention of Infant Mortality and for the Welfare of Infants, and under the patronage of the King and Queen, there was held an English-speaking Conference on Infant Mortality in London, August 4–5, 1913.

The fact that practically every English-speaking country was represented, no less than fifty being present from the United States alone, made it a notable gathering. The Right Honorable John Burns, president of the local government board, was president of the conference and Dr. Arthur Newsholme and Sir George Newman presided respectively over the meetings of the administrative and medical sections. The following resolutions, adopted at the final general session, express the sense of the conference:

1. That this conference urges that the maternity benefit be made the property of the mother both in practice and in law.

2. That the attention of the board of education be drawn to the extreme desirability of making the grant earned by "recognized" infant welfare centers depend in future on their efficiency, on the number of registered attendances of the mothers at consultations, classes, and talks, and on the number of home visits paid under adequate supervision.

3. That, in view of the damage liable to be wrought in growing girls by injudicious stress of education, especially during puberty and adolescence, this conference feels bound to deprecate any form of education for girls which pays insufficient attention to establishing good bodily health and development and complete fitness for maternity and the practical care of a home.

4. That this conference urges upon the government the necessity, in the interests of both mother and child, of legislating for the registration of stillbirths.

5. That this conference urges upon the government the necessity for the more complete medical certification of death, and that the medical death certificates should be forwarded to the registrars, as confidential documents under sealed cover.

6. That the time has arrived for steps to be taken with a view to securing the better training of women who apply for the certificate of the central midwives' board.

7. That this conference requests the executive committee to communicate with the general medical council and the degree and license conferring bodies with a view to infant hygiene being given a more important place in the medical curriculum.

8. In view of the large percentage of stillbirths and infant deaths directly attributable to venereal diseases and considering that infant blindness and other congenital defects are in many cases due to the same cause, the English-speaking conference on infant mortality urges the respective governments of the countries therein represented each to appoint a commission to inquire into the prevalence, the causes, the provision of treatment, and the possibility of the prevention of these diseases.

9. That the executive committee be instructed to take whatever steps they may think desirable in order to insure a microscopical examination of milk, to be supported by analytical methods.

Anti-mumps Inoculation.

"The director of the Pasteur Institute, M. Roux, has reported experiments which have been made by MM. Nicole and Conseil with serum taken from parotid glands of patients who were suffering from mumps. A number of monkeys were inoculated with the serum and a mild form of the disease was produced, which gave immunity against further infection."

The Medical Officer, August 9.

Score-Card Inspection of Doctors' Offices.

Recent amendments to the Sanitary Code of the Louisiana State Board of Health provide for the inspection of physicians, dentists, etc., and a scoring system similar to that used in the inspection of dairies and tenements. When the score falls below 50 points, charges of infraction of the code are to be made. Among the points to be noted and graded are: "Freedom from bad odor," "personal appearance of attendant," "personal appearance and breath of the person in charge," "presence of electric fan and a library," "general neatness" and "sanitary condition."

While the measure has received some unfavorable comment and ridicule from irresponsible or unthinking persons it deserves serious consideration and may well be copied by other states. It will be found that there is great necessity for it in many cases, while those who are above suspicion will refrain from casting stones if their best judgment has time to come to the front. It may be suggested also that not all board of health laboratories present the exemplary orderly, spotless, and sanitary condition which might serve as an inspiration to all beholders and that laboratories and inspectors might well be "scored" in more ways than one.

Junior Sanitary Police.

The *Survey* of August 23 tells of the operation of a new and effective aid in the anti-fly and general clean-up crusade which has been carried on in Cleveland during the past summer, as follows:

The "junior sanitary police" are boys recruited from the sixth, seventh and eighth grades of the city schools. In each school district the force is officered by a chief, an assistant chief and four inspectors. The principal of the school appoints the entire force. Needless to say, it is considered no small honor to be appointed a member of the "junior sanitary police." The official badge is prized highly. The girls have a part, too, some of them being made "sanitary aids."

The school district is sectioned off and each member of the force made responsible for one section. He must make regular inspections. When he finds a dirty stable, a rubbish-filled back yard, a heap of fermenting lawn clippings or a leaking garbage receptacle he has, of course, no power to compel the owners to clean up; but in nine cases out of ten he can persuade them to do so. And the children are proving splendid educators. Now and then persuasion fails and the abuse is uncorrected. Then the case is referred to a boy inspector and later to the boy chief. If the courteous efforts of these high officials also prove unavailing, the report goes to the board of health and a threat of a suit brings the offender sharply to time. He is eventually made to realize that the alert consciousness of a whole city is back of these badged children.

The schools were further utilized as distributing stations for fly pamphlets and circulars. Each bit of educative literature as it came out was placed in the hands of every child in the schools of Cleveland and thence carried into the homes.

PUBLIC HEALTH NOTES.

Sewer Ventilation.

In view of the general discrediting of the old theory that sewer gas and other "poisonous exhalations" were capable of producing disease the following article clipped from *The Medical Officer* is interesting. While the author does not express any opinion in regard to the connection between sewer gas and typhoid, the grouping of the facts would perhaps indicate that a suspicion, if not a conviction, exists in the mind of the writer.

"When comparing the annual reports of medical officers of health issued fifteen or twenty years ago with those of the past few years, nothing is more noticeable than the absence in the latter of references to the need for efficient ventilation of sewers. This is no doubt partly due to the attainment by sanitary engineers of a more expert knowledge as regards the laying of sewers and to a more intimate acquaintance with the behaviour of the air currents in sewers. There ought to be at the present day no difficulty in securing in a properly laid sewer entire freedom from noxious emanations. In this connection it is of interest to place on record the experience of the borough of Southport. Dr. Weaver, the medical officer of health, in his last annual report, states that some years ago, on account of the number of complaints of offensive smells arising from manholes in the streets, the matter of sewer ventilation engaged the serious and constant attention of the health committee, and after trying various methods at considerable expense and trouble, with more or less success, it was finally decided to close up all surface manhole grids as far as practicable and ventilate the sewers with Webb's patent ventilating lamps. At the end of the year 1912 there were about 50 of these lamps in use in Southport and for several years there has hardly been a complaint of sewer smells. Coincidently with the adoption of this policy there has been a marked decrease in the incidence of typhoid fever in the borough. The annual average number of cases of the disease occurring during the ten years ending 1903 was 36, while since that date the number has steadily fallen, until during the past three years the yearly average has been about six. The death rate has also fallen from an average of ten per annum in the earlier period to just over one per annum in the later. In other towns where this or similar methods of sewer ventilation have been adopted like results have followed."

Pure and Wholesome Water.

"In a paper on the subject 'Pure and Wholesome Water,' by Mr. George A. Johnson, read before the Minneapolis convention of the American Waterworks Association, the weakness of sanitary science in its efforts to interpret the significance of the data obtained in the examination of water was laid bare. Mr. J. W. Ellms, in discussing the paper, said that he sympathized to some extent with Mr. Johnson's pessimism as regards the unsatisfactory state of the knowledge on this subject and the inability of sanitarians to prove mathematically whether a water is or is not pure and wholesome. Nevertheless, it appears to Mr. Ellms that a more optimistic view can be taken of the matter. It can hardly be denied that sanitarians are constantly distinguishing between pure and impure waters and that they do so successfully despite the varied and complex character of the data set before them. Mr. Ellms states that no satisfactory discussion of this question is possible unless there is an agreement upon the definition of a 'pure and wholesome water.' Mr. Johnson, he believes, has correctly defined what is a common understanding of sanitary purity for a drinking water, viz., 'water which is free from noticeable turbidity and color, offensive tastes and odors, and forms of bacteria known to produce disease.' So far as the tests which are used to detect objectionable physical properties are concerned, he believes them to be fairly adequate for the purpose. Natural waters may possess undesirable properties in varying proportions, and toward them different persons will have varying degrees of aversion. Herein lies the difficulty of strictly defining the limits for those qualities which offend the æsthetic sensibilities of the individual.

"The value of many of the chemical tests taken separately is slight, but considered collectively and in combination with the information supplied by the bacteriological and physical tests, they throw much light on the past history and present condition of the water. Certain of these chemical tests, Mr. Johnson stated, are invaluable, especially where the operation of purification plants is dependent upon a knowledge of the amounts of certain constituents, as, for example, the degree of alkalinity of a water in plants employing chemical coagulants. Even the nitrogen content of the water, knowledge of which Mr. Johnson seems to believe is particularly useless, Mr. Ellms believes is not without value in classifying a water and determining its general character.

"From the hygienic standpoint the determination of the purity and safety of a water for drinking purposes is most difficult. The inadequacy of bacteriological methods must be admitted. However, there is no reason for discarding the only available methods for obtaining information, merely because these methods do not furnish all the knowledge that is desirable. Most of the evidence obtained is purely circumstantial. Bacteriological technique does not permit of easy and rapid methods for the isolation of disease-producing organisms. Nor is it by any means certain that all of the water-borne diseases are known. Pathological conditions in the human body are probably produced by organisms, of which we at present have no knowledge. These organisms may have water as their actual habitat, or they may become adjusted to such an environment. Hence the difficulty of establishing the purity of a water unless our technique provides means for the identification of all known pathogenic organisms. In lieu of direct proof our ignorance forces us to resort to circumstantial evidence, which often is of a most convincing character.

"Mr. Ellms states that he has a great deal of sympathy for Mr. Johnson's attitude toward the sanitary significance, or, rather, lack of it, attached to B. coli. This organism is probably harmless in itself and yet its frequent association with other 'vicious and disorderly' bacteria has given it such a bad name that it often suffers on account of the bad company it keeps. Its presence is not *prima facie* evidence that disease-producing organisms are associated with it. Nevertheless, its presence in a water, when taken in connection with evidence obtained from other sources, can usually be interpreted properly and with a fair degree of correctness.

"The chemical, bacteriological, physical, and microscopical data obtained by the usual methods of examination do afford a basis, he thinks, for forming a fairly correct opinion as to the sanitary quality of a water. If the knowledge, gained by these tests is supplemented, as it always should be when possible, by information relating to the sanitary conditions surrounding the source of the supply, then one is possessed of all the knowledge about the water that can be obtained. By intelligent interpretation of this information a fairly correct judgment of the character of a water is possible."

The Engineering Record, August 2, 1913.

A National Bureau of Tuberculosis Legislation.

The following report of the Committee on Legislation was presented before the National Conference of Tuberculosis Secretaries at Washington, D. C., by Dr. R. H. Bishop of Cleveland, the chairman of the committee.

"Your Committee on Legislation, in presenting this report does not propose to report upon the merit or demerits of the numerous tuberculosis bills passed by the various legislatures these last few months.

"That tuberculosis is undoubtedly becoming a popular subject for legislation is evidenced by the fact that in 23 out of 39 legislatures in session this year careful consideration has been given to the enactment of laws having a direct bearing upon some phase of the problem. We see governors pledging themselves to the support of tuberculosis measures in their inaugural address; we see senators and representatives anxious for the opportunity of 'fathering' tuberculosis measures; and we see State health departments, private organizations of all kinds pushing and pulling and 'putting through' many kinds of so-called health measures. Thousands of dollars are being appropriated in order to build sanatoria and hospitals.

"The awakened interest in tuberculosis, resulting in legislative support, is indeed a matter of congratulation and certainly speaks well for the campaign that is being waged and promises much in the future.

"It is mainly with the future legislative programs in mind that we direct your attention to a consideration of the general lines of legislative endeavor of the past. Having grouped the laws thus far enacted we shall attempt, if possible, to come to some conclusions as to what fundamental provisions looking toward the control of tuberculosis, can safely be grouped, so that a number of uniform laws covering these points can be enacted by each state in the Union, and then what steps should be taken to bring about the enactment of such legislation.

"In attempting a classification of the laws bearing on tuberculosis your committee finally decided upon the following:

"(1) General Tuberculosis Laws.

"(2) Laws providing for district, county and municipal hospitals, sanatoria and dispensaries.

"(3) Laws providing for state hospitals, santoria and dispensaries.

"(4) Laws regulating expectoration.

"(5) Laws providing for the dissemination of knowledge concerning tuberculosis.

"(6) Laws providing for the segregation of advanced cases.

"(7) Laws providing for the employment of visiting nurses by county commissioners.

"(8) Laws providing for the establishment of bureaus of tuberculosis under state boards of health.

"(9) Laws carrying miscellaneous provisions and having an indirect bearing on tuberculosis.

"(10) Laws looking toward the elimination of bovine tuberculosis.

"General tuberculosis laws may be said to be in operation in thirty-three states in the Union, that is, tuberculosis is a reportable disease in that number of states. Upon consideration of these laws, however, one is immediately impressed with the variations existing in them.

"The most comprehensive laws, and they are few, provide for the following:

"(1) Tuberculosis is declared to be an infectious and communicable disease.

"(2) All cases must be reported.

"(3) Examination of sputum and furnishing of material for collecting.

"(4) Keeping of records, and secrecy of records.

"(5) Sending of literature either to physician to be given to patients or to patients direct.

"(6) Free disinfection.

"(7) Rooms vacated by a consumptive not to be occupied until after disinfection.

"(8) Use of placards where a case has moved out of a house and the house, in the estimation of the health officer, needs thorough cleaning and renovating.

"(9) Fines for not reporting cases.

"(10) Fees for reporting cases.

"These ten points may be said to embrace all the points that should be covered in the general laws concerning tuberculosis. Your committee feels that it would be possible to work out a uniform law embracing the points which should be enacted in most of the states.

"Your committee recognizes that anything like uniform legislation in regard to hospitals and sanatoria is entirely out of the question, but it does feel that there is much to be gained from a study of the experience of New York, Pennsylvania, Ohio, Wisconsin and other states in seeking legislation along these lines, and that in view of this experience certain provisions should be insisted upon, such, for instance, as the provision for absolute separation of the tuberculosis hospital from the county infirmary.

"Is legislation permitting the building of large state sanatoria to be worked for, or is it much more worth while to try for county or district hospitals, with a state subvention?

"Your committee feels that in the case of legislation providing for the employment of visiting nurses by countycommissioners and in the establishment of a bureau of tuberculosis under the State Board of Health, that uniform legislation could be secured.

"Your committee has been impressed with the mass of half-matured bills that have been presented for enactment into laws, bills that easily could be strengthened by a change of phrasing or some addition. We feel that a very great effort should be made to have all tuberculosis legislation originate from some one organization.

"Your committee has found, too, many instances where the backing and support of the National Association has meant success in the passage of measures.

"In view, then, of the above findings, your committee presents for your consideration and approval the following recommendations:

"That the National Conference of Tuberculosis secretaries submit a resolution to the directors of the National Association for the Study and Prevention of Tuberculosis providing for a bureau on legislation in that association which shall constitute an authoritative source of information and act as a medium for the promotion of legislation. The bureau should provide for the following:

"(a) A collection and codification of the laws pertaining to tuberculosis in each state.

"(b) The preparation of a leaflet or pamphlet setting forth the fundamental principles that should be incorporated in legislation bearing upon the various phases of tuberculosis work.

"(c) The bureau should get in touch with the states having legislation on tuberculosis, arrange a program for additional legislation, and suggest amendments and improvements to be brought about in existing laws.

"(d) The bureau should try to get in touch with some organization of authority and prestige in every state in the Union and show them the need for legislation, and it should then formulate a legislative program."

Garbage Disposal in Chicago.

"A garbage-disposal commission ,with $10,000 to expend for investigation has been appointed by the finance committee of the Chicago City Council. On the commission are two aldermen, the commissioners of health and public works, Mr. Henry A. Allen, acting city engineer, and two members of the Woman's City Club. The commission will direct the investigation, hiring such experts as are needed."

The Engineering Record, July 26, 1913.

An Index of Parental Inefficiency.

The Bulletin of the Chicago School of Sanitary Instruction for July 19 publishes a chart entitled an index of parental inefficiency by wards. The chart shows the diarrheal disease death-rate per 10,000 of infant population. Observations show that there is a very striking contrast between various sections of the city and the article draws the following conclusions:

"In a general sense, the parental efficiency of a community may be guaged by its infant death-rate from the acute intestinal or so-called diarrheal diseases. A high death-rate from these diseases implies improper care of the child, ignorance, carelessness and poverty being the contributing factors.

"Lack of knowledge of proper care of the child is the chief factor in infant mortality. No humane mother will wilfully feed her child improper food or drinks, dirty milk or other harmful things, nor will she intentionally deprive it of the benefits of pure air, proper dress, body cleanliness or other essentials to health. It is her failure to identify right from wrong that is creating the havoc. She must be taught; mother efficiency must be developed.

Industrial Colony for the Tuberculous.

"All who have had experience with the control of tuberculosis realize the many difficulties to be overcome. Especially in connection with sanatorium treatment, much discouragement has resulted from the fact that, in many instances, patients discharged with their disease arrested are compelled to return to the crowded and. for them, unhealthful environment of a large city, where they promptly relapse and so nullify most of the good work which has been done by the sanatorium.

"The lack of suitable occupations under proper conditions for such patients has been the great stumbling block in the way of more lasting and substantial progress.

"A number of years ago, Dr. Hermann M. Biggs urged the establishment of an industrial colony in a locality in the country where the climatic conditions were favorable for tuberculous patients, where the land was cheap and where sanitary workshops could be erected, and where employees could spend the unemployed hours of the day, twelve or fourteen hours at least, out of doors. Dwellings with outside sleeping porches would be provided, patients and their families would be kept under continued supervision, all of the conditions of life, including their food and dietary, would be supervised, and the earliest indications of return of disease would be immediately recognized.

"Through the efforts of Doctor Biggs, a law has just been passed by the legislature and signed by the governor authorizing any municipality or corporation maintaining a hospital or sanatorium for the treatment of tuberculosis to establish and maintain workshops in connection therewith, for the production of articles or supplies required by such hospital or sanatorium and by any other institution or department of such municipality. No person is to be employed in the workshop so established, except in a supervisory capacity, unless he is or has been a patient in the tuberculosis hospital or sanatorium.

"This bill represents an enormous step forward in the administrative control of tuberculosis, for it will enable discharged patients to live and work under sanitary conditions. We understand that it is proposed to care for the families of such discharged patients in an industrial colony adjacent to such sanatoria and under the supervision of the sanatorium authorities."

New York Medical Journal, April 26.

Purification of Water by Ultra-Violet Light.

The Engineering Record for August 2 contains an article by Dr. von Recklinghausen of the Westinghouse-Cooper Hewitt Company of Paris describing some recent improvements in methods of sterilizing water by treatment with ultra-violet rays. Although data in regard to costs compared with other processes is lacking the claim is made that a sufficient trial has been made to prove that the system can now be ranked as an industrial process.

The essentials of the plan used continuously for eight months in a municipal water plant in Europe are as follows: Water is taken from a river at a rate of about 1,700,000 gallons per day. The water is clarified by sand filtration to remove algae and particles of suspended matter which may stand in the way of complete sterilization. Precipitation and mechanical filtration might be used with equal success. The filtered water is passed through sterilizing canal units, into which project the new form of ultra-violet lamp, known as the "pistol" lamp from its shape. This lamp runs on 500 volts and requires 3 amperes, making twice the wattage used in the old form but producing about ten times as much light, of which practically all is absorbed by the water instead of the 60 per cent. utilized in the old form. By the use of this form of lamp combined with baffle-plates placed opposite to insure rapid circulation of water in the canal it is possible to sterilize from 500 to 2,000 tons of water per day with only one or two lamps. The theoretical period of exposure is as short as a tenth of a second at a distance of one inch from the lamp but will vary with the degree of clearness of the water.

Tuberculosis Death Rate of Berlin.

The Journal of Outdoor Life for August reviews an article by Prof. A. Kayserling, originally printed in the April number of "Tuberculosis" (Berlin).

"Professor Kayserling goes back to 1722 for his records although most of his paper deals with the period between 1855 and 1911. The accompanying chart summarizes his findings. He distinguishes two periods in the course of the tuberculosis mortality curve. In the first cycle between 1855 and 1886 there was no decided decrease in the tuberculosis death rate, it remaining about

32 per 10,000 living throughout that period. With the year 1887, however, the curve begins to show a decided drop, which continues more or less regularly up to 1911. In 1886, out of an average population of 1,339,956 in Berlin, 4,318 people died of pulmonary tuberculosis, while in 1911, with an increase of 730,000 population to 2,071,940, the number of deaths was decreased by 599 to 3,719. The death rate in 1911 was 17.95 per 10,000 population as against 35.11 in 1855 and 29.72 in 1887. Professor Kayserling finds also that the decrease in the last twenty-five years is manifest for both sexes in every age period with the exception of females of more than 70."

Blackboards and Dust.

"In Dr. L. D. Cruickshank's final report as chief medical officer for the Carnegie Dunfermline Trust, there is a note by Dr. Alister Mackenzie on the subject of blackboards. He points out that while blackboards and chalk are almost indispensable in school, some care should be taken to diminish the amount of chalk dust scattered in the process of cleaning the board. Teachers are apt to inhale large quantities of this dust in the ordinary method of wiping the board with a large duster. Doctor Mackenzie adds: 'The inhalation of fine particles of insoluble matter into the lungs cannot fail to lower the vitality of these organs, and may pave the way for serious disease. The introduction of weighted chalks has helped to diminish an evil, which can be entirely overcome by the use of a slightly damp sponge for cleaning and a clean duster for drying. When not too damp the sponging does not interfere with the writing surface, even immediately after use, and the drying required is trifling. When blackboard work is done by infant classes, this dust problem may become very acute, and will require special attention."

The Medical Officer, June 21.

List of Civic and Municipal Books.

"A selected list of municipal and civic books has been prepared for free distribution by the American City Bureau of 93 Nassau Street, New York. The list contains information concerning the best available books in almost every field of municipal and civic reform. In addition to the title, author and price, a brief summary of the contents of each book is given. The books are arranged alphabetically under subjects for the purpose of easy reference. Some of the subjects taken up are Public Baths and Swimming Pools, Child Welfare, City Planning and Congestion, Waste Disposal, Health and Public Sanitation, Housing, Insect Extermination, Parks, Playgrounds, Recreation, and Tuberculosis."

Journal of Outdoor Life, August, 1913.

Damages for Illness from Sewer Gas.

A very interesting judicial decision in England has been the award of damages to the amount of five hundred dollars to a family which proved that it had been made ill by sewer gas escaping through the ventilating shaft of a sewer. It is perfectly true that the local Government Board has carried on an investigation extending over several years, the conclusion of which was that emanations from sewers and drains, although objectionable to the senses, are not the cause of and do not foster the spread of any disease. This is well known to be true since Winslow and others in this country have disposed of the sewer-gas bogey, but in Hertfordshire, Mr. Justice Phillimore decided that there were smells and that people were made ill by them; that the shaft was improperly erected—and the jury quite agreed that all this was so—that it was a nuisance and injurious to health and that the defendant town council was at fault.

The evidence was to the effect that when the wind was in a certain direction fumes entered the house. The whole family suffered from diphtheria, headaches and diarrhea, from September, 1911, till July, 1912, when the shaft was removed, since which time the family has enjoyed good health. The shaft, it appears, rose twenty feet out of the ground and was of the pattern generally used for such purposes.

It is noted that the case will be appealed, and there should be no lack of expert evidence to show the biological absurdity of certain portions of the allegation; but the time is not yet far enough away from the popular belief in sewer gas for a jury to be safely trusted with so expert a matter. The town authorities, if the appeal fails, will be between the devil and the deep sea, for the law of the land compels them to ventilate their sewers, while the citizens may apparently collect damages whenever they "smell a smell." The case furnishes a straw to show also how definitions in sanitation are changing and that a new legal status is needed. There must be recognized the fact that comfort should have its place and that a nuisance may be properly attacked even though it is not a cause of sickness.

The Clinic, Boston Transcript, July 23, 1913.

Tuberculosis Insurance for Clothing Workers.

Not many people are aware of the fact that as a direct result of the strike of the cloak, suit and skirt workers of New York City two years ago, and of the more recent strike of the dress and waist makers a joint Board of Sanitary Control was appointed which has for nearly two years been working to improve sanitary and health conditions in the workshops. The board consists of representatives of the unions and of the manufacturers, with a physician, Dr. George M. Price, at the head. According to a recent report, there are 1,800 shops—the industry employing over 45,000 men and women, which number increases up to over 52,000 at times. Shops that are free from sanitary defects are given certificates and a list of these certificated shops is published for distribution among the workers. At the last inspection 61.6 per cent. were on the list, employing nearly 71 per cent. of the workers.

The board is working out a scheme for tuberculosis insurance among its workmen. An examination of 800 workers showed that 10 per cent. were suffering from bronchitis, a few from various skin and other infectious diseases, while 1.6 per cent. were suffering from incipient or advanced tuberculosis.

Clean Teeth.

During the last five years great strides have been taken by educators throughout the country to teach children how to care for their teeth. People of 50 years of age did not have the opportunity when they were children to have their health guarded by proper care of the teeth.

It has been demonstrated recently that 90 per cent. of the children in the New York City Public Schools are in need of a dentist's services. It has been estimated that if children only would go to the dentists for such work as is immediately necessary, all the dentists in the country could not keep up with the demand for services.

A very interesting experimental test was conducted at the Marion school of Cleveland where, under the direction of Dr. Wm. C. Ebersole of the National Mouth Hygiene Association and Miss O'Neil of the Marion school, there was established an experimental class looked after both in the home and school by competent nurses. These nurses went into the home and taught the children how to masticate their food; at school the children were taught how to brush their teeth and a dental clinic was established and the children were shown that tooth care was not so difficult if it was made a regular part of one's life. It is stated that the children who had previously been dull and lacking in energy became better able to do their school lessons; their efficiency was increased; their deportment very much better than before.

COMMUNICATION.

To the Editor:

Sir:—In a special article in the *Medical Record* of November 30, 1912,* an effort was made to discredit the infectious theory of pulmonary tuberculosis, on the ground that the results of the modern method of combating this disease furnish proof that the crusade has not only been abortive, but that it has acted as an aggravation rather than as an alleviation. The author of this paper based this sweeping charge largely upon so-called statistical evidence and reached the amazing conclusion that "the mortality from this disease is greater than it was before the inauguration of the crusade." This original article was reprinted and probably quite widely distributed and was followed by a communication to the *New York Tribune* under date of January 5, 1913, in which the various allegations made in the first article were repeated and emphasized. As the charge thus made was brought against all those who contend that pulmonary tuberculosis is an infectious disease and that some, at least, of the methods of combating it must be based upon that theory if the best results are to be obtained, it is worth while to examine briefly into the quality of the so-called statistics which were submitted as evidence. Certainly the proof ought to be conclusive before we are asked to believe "that the decrease of the death rate of consumption has not been accelerated one whit by the preventive measures which have been evoked during the last ten or fifteen years; on the other hand, there are positive indications that, on the whole, the number of deaths from this disease have, for some unaccountable reason, increased during the years when these measures were in full sway. In other words, the modern prevention idea of stamping out consumption by fumigation, disinfection and isolation is evidently proceeding on a blind trail."

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*"Effect of Present Prevention on the Spread of Consumption," by Thomas J. Mays, M. D.

The statistics presented consist only of death rates from pulmonary tuberculosis, populations and deaths being omitted in the tables, making a check upon the calculations difficult, if not impossible, for most readers. With official information at hand, however, for the same cities used by the author, I have tried in vain to square the facts with the figures presented by him in the *Medical Record* in his Tables I and II. In Table I the death rates from pulmonary tuberculosis are presented for thirteen American cities, the records of which extend over a period of thirty-seven years, and in Table II similar rates are presented for fourteen other American cities, the mortality records of which extend over periods varying in length from thirty-three to nineteen years. The terminal year in all cases in both tables being 1911.

To prove that the mortality rate from pulmonary tuberculosis has not declined as rapidly during the last half as during the first of the periods represented by the mortality statistics of these twenty-seven cities, the average death rate for a period of six or seven years at the beginning of the respective periods, in the middle of the periods, and at the close of the periods are considered, and the difference between the average rate of the middle years and the initial years is considered the diminution rate of the first half; and the difference between the average rate of the middle years and the terminal years is considered the diminution rate of the last half of the respective periods under observation. This method is somewhat elaborate and is very crudely described in the original article, making it quite difficult for the reader to understand what the figures in the tables really mean. To add to the confusion, the author refers throughout to the rates as *rates per 1,000*, when, as a matter of fact, they are, as nearly as can be determined, rates per 10,000 of population.

Just why these groupings of thirteen cities in Table I and fourteen cities in Table II were made is not quite clear, for one city, Buffalo, is included in Table I, which has no reliable record of pulmonary tuberculosis mortality during the six years, 1875–1880, inclusive,* while five of the cities in Table II, namely, Baltimore, Lowell, Milwaukee, Pittsburgh and Richmond, should have been included in Table I, as their mortality records extend back at least as far as 1875. Two other of the major cities of the United States, Newark, N. J., and San Francisco, Cal., have been left out of the account altogether, and it is interesting to note that the records of both of these cities are complete back to 1875 at least, and that their mortality experience from pulmonary tuberculosis has been quite contrary to the author's main contention, that the death rate from that cause has not declined as rapidly in recent years as during the 70's and 80's.

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* According to a letter from the local Department of Health.

Furthermore, in calculating the aggregate diminution in the death rates of the thirteen cities combined in Table I, for illustration, the author has given no consideration whatever to the relative size of the cities, but has given equal weight to cities like New York and Reading, the one having millions of population and the other only 96,711, in 1910. After elaborate calculations, the author finds that the normal diminution *rate per 1,000* in the first half of the thirty-seven-year period aggregated 289, and during the latter half of the period 262. He then draws the conclusion that there was a *net increase of 27 per mille* during the last half of the thirty-seven-year period!

Besides using an obviously fallacious method to arrive at the conclusion desired, a careful examination of the individual rates discloses the fact that they do not agree in a single instance with the official figures when the calculations are made on the basis of populations estimated according to accepted standard methods. To illustrate—the aver-

SUMMARY OF THE MORTALITY STATISTICS OF PULMONARY TUBERCULOSIS IN TWENTY AMERICAN CITIES,* 1875–1912.

Years.	Population.	Deaths.	Death rate per 10,000 population.	
1875–'79	26,975,558	85,132	31.6	
1880–'84	31,133,521	100,017	32.1	
1885–'89	36,373,850	103,970	28.6	
1890–'94	43,090,853	108,049	25.1	23.4
1895–'99	48,984,573	107,788	22.0	
1900–'04	55,807,618	117,561	21.1	
1905–'09	62,889,135	122,721	19.5	
1910–'12	40,592,883	70,071	17.3	

* Baltimore, Boston, Brooklyn, Charleston, Chicago, Cincinnati, Lowell, Milwaukee, Newark, New Haven, New Orleans, New York, (Manhattan and Bronx), Philadelphia, Pittsburgh, Providence, Reading, Richmond, St. Louis, San Francisco and Washington.

SUMMARY OF THE MORTALITY STATISTICS OF PULMONARY TUBERCULOSIS IN THREE LARGE AMERICAN CITIES,† 1812–1912.

Years.	Population.	Deaths.	Death rate per 10,000 population.	
1812–'21	2,808,291	11,755	41.9	
1822–'31	3,934,572	16,126	41.0	
1832–'41	5,930,880	23,607	39.8	
1842–'51	9,082,028	31,168	34.3	
1852–'61	13,633,399	50,964	37.4	37.2
1862–'71	17,407,436	64,492	37.1	
1872–'81	22,246,544	81,665	36.7	
1882–'91	28,011,281	95,355	34.0	
1892–'01	35,838,993	90,273	25.2	
1902–'11	45,854,515	98,064	21.4	
1912	5,214,663	9,393	18.0	

† Boston, New York (Manhattan and Bronx), and Philadelphia.

age diminution in the death rate from pulmonary tuberculosis for Chicago in the first half of the period is given in the article in the *Medical Record* as 13.0, when, as a matter of fact, the rate increased 0.3, not *per 1,000*, but 10,000; and in the latter half of the period, the death rate from pulmonary tuberculosis in Chicago, given in the article in the *Medical Record* as having increased 2.0 per 1,000, as a matter of fact, decreased 0.7, not *per 1,000* but per 10,000 of population. In all the other cases where official records are obtainable, the differences between the true rates and the rates given in the article in the *Medical Record* have been found to be quite as striking as those for Chicago.

It is a fact well known to those familiar with the vital statistics of this country that there has been a persistent decline in the mortality rate from pulmonary tuberculosis in practically all of the cities and states for which we have reliable records, and that this decline has been quite as marked during recent years as during the 70's and 80's, and this in spite of the fact that there has been an enormous addition to the populations of these cities and states, through immigration, of persons of ages at which the mortality from this cause is highest. That this statement is true is evident from the figures presented in the two tables on page 1121.

Whether or not the diminution in the death rate from phthisis has been as rapid during the later years of the periods covered by these tables, as during the earlier years, is, it seems to me, aside from the issue, unless all the factors which contribute to a high or low mortality from this cause are taken into account. It will be obvious, however, to anyone that the general or crude death rate has not increased in recent years, but has declined persistently and as rapidly as could reasonably be expected, when all the complex factors conditioning the mortality are carefully considered.*

The first table shows that the death rate from pulmonary tuberculosis in twenty American cities combined fell 26.0% in the first twenty-year period interval and 26.1% in the second. This method of measuring changes in a given death rate has been used for years and by the most eminent statisticians.† Obviously, if the average death rate for the middle years of a given period is to be taken as a basis of measurement, the rate for that section of the total period should be used as a dividend in the one case and as a divisor in the other. It should be used as a dividend when measuring the change in the rate during the first half and as a divisor when measuring the change in the rate during the last half of the period under observation. The method adopted in the tables in the *Medical Record* here referred to is fallacious, as it assumes that a decline in the death rate from pulmonary tuberculosis from forty to thirty per ten thousand of population is equivalent to a reduction in the same rate from thirty to twenty, during equal periods of time. Not only is this method fallacious, but it fails to take account of the fact that it is almost always progressively more difficult to bring about additional improvement in the death rate as the rate approaches more and more near to the zero mark.

Any appeal to the actual facts of statistical experience in this country, or in any other country, such as England and Wales or Germany, where modern methods of combating tuberculosis have been in vogue for a number of years, will, I am convinced, prove to the most skeptical that the conclusion is absolutely unwarranted, that the mortality from this disease is greater at the present time than it was before the inauguration of the modern campaign, which has been waged, to some extent at least, upon the theory that pulmonary tuberculosis is infectious. No theory, however, can be strengthened by an appeal to figures such as those presented in the *Medical Record* of Nov. 30, 1912, and in the *New York Tribune* of Jan. 5, 1913.

F. S. Crum.

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* For a full discussion of the decline in the tuberculosis death rate during the last forty years, amplified by numerous statistical tables, see the Transactions of the Ninth Annual Meeting of the National Association for the Study and Prevention of Tuberculosis.

† For an illustration see Longstaff's "The Recent Decline in the English Death Rate," Journal of the Statistical Society, June, 1884.

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SOME FUNDAMENTAL PHYSICAL FACTORS IN THE PROBLEM OF THE CONTROL OF THE ATMOSPHERIC ENVIRONMENT.

Earle B. Phelps.
Massachusetts Institute of Technology.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs September, 1913.

The problem of ventilation, as we conceive it today, is but a part of a much bigger problem which deals with the effect of the environmental atmospheric conditions upon the health and comfort of the individual. The full solution of a problem of this magnitude and complexity necessarily involves a separation into factors.

These are for example, the engineering and mechanical factors. These are capable of complete solution although progress is still possible in the direction of economies. Air conditioning, however, is now an established engineering science and the engineer is prepared to supply any kind of air that is desired.

Then there are the physiological factors, or the response of the organism to various conditions. Here our knowledge is less definite and has not advanced beyond a general conception that there are certain conditions which make for comfort and certain others which do not; and some approximate, qualitative idea of the influence of temperature and humidity upon physiological functions. Here again separation into simple factors is necessary and our failure to get quantitive measure of the actual relationship is due to the confusion of too many independent variables.

The primary physiological function with which we have to deal is the dissipation of heat from the body. In its physiological aspects this function is complex, but in its physical aspects it is extremely simple. Heat dissipation is accomplished by evaporation of moisture, by direct heat transfer to the surrounding cooler air, and by direct radiation to a nearby cooler surface, or by a combination of two or more of these. The second or the third factor may be negative in its action, *i.e.*, may actually warm the body and all three may vary quite independently; but physiology demands as a net result, that the sum total of these three kinds of heat interchange shall have a certain determined value. If this becomes physically impossible fever and collapse follow. Short of actual collapse, however, there are manifestations of discomfort which record the attempts of the body to adjust itself to the environmental conditions and to maintain the necessary heat dissipation, while within a still more restricted range such adjustment is accomplished without discomfort. If there were but one variable physical factor, or if the several factors were mutually dependent variables, or again if they were independent in their physiological effect like two distinct kinds of poison, then the problem of delimiting the three regions of normal adjustment, adjustment with discomfort and total failure of the adjusting mechanism would be capable of a simple experimental solution. Unfortunately neither of these assumptions holds. There are three methods of heat dissipation; evaporation, direct transmission and radiation. They are mutually independent as physical variables but affect the body in the same way.

For example it is not possible to state that any particular rate of evaporation is essential to comfort. In a cool air heat is transmitted to the air and evaporation is reduced, but equal comfort may be experienced in a warmer air with less transmission of heat and a compensating increase in evaporation.

These considerations show that anything more than an empirical solution of the major problem involves of a necessity a complete analysis of the inter-relationship of these three modes of heat transfer. The present discussion is an attempt to make such an analysis. It will first be necessary to reduce the three factors to still more simple and fundamental terms.

Looking at the matter now from a purely physical point of view evaporation is a function which depends upon (a) the capacity of the environment to receive additional moisture, and (b) the rapidity with which evaporated water is removed from the immediate environment. In turn (a) depends upon the temperature of the air and upon the amount of moisture already present (humidity) and (b) upon the velocity of movement of the air over the moist surface.

Direct transmission of heat to the surrounding air depends upon (c) the temperature of the air, (d) its heat capacity, (e) the volume of air brought into contact with the warm surface per unit of time and (f) the coefficient of diffusion of heat through the air. The relation of factor (c), the temperature, is obvious, since the rate of heat transmission between two bodies is proportional to the difference in their temperatures. Factor (d), heat capacity, is readily illustrated by comparing air cooling with water cooling, the temperature of the two media being the same. The heat capacity of air depends in turn upon the humidity. Factor (e) shows one method (convection) of getting the heat away from the warm surface, *i.e.*, by removing the heated air. It depends upon the velocity of movement. Factor (f) shows a second method, (conduction); it depends upon temperature and humidity.

Radiation is in general of minor interest but in especial cases, direct sunshine for example, it is of some importance. It depends upon the temperature and distance of the warm or cool object.

Summarizing now this analysis, we have the following relationships, each factor in the scheme depending upon those subordinate to it:

Modes of Heat Loss.

A. *Evaporation.*
  (a) Humidity (departure from saturation).
    Temperature.
    Humidity (actual).
  (b) Removal of moisture.
    Velocity of air movement.
B. *Transmission of Surrounding Air.*
  (c) Temperature.
  (d) Heat capacity of air.
    Humidity.
  (e) Volume of air per unit of time.
    Velocity of movement.
  (f) Coefficient of diffusion.
    Temperature and
    Humidity.
C. *Radiation.*
  (g) Distance of object.
  (h) Temperature of object.

While the inter-relations are somewhat complex, one is struck with the fact that leaving out of consideration the radiation factor all the others finally reduce to three, temperature, humidity, and velocity of movement of the surrounding air. We have to consider also the temperature and distance of the nearest solid mass. Moreover it is apparent that any one of these may be varied and a corresponding change made in any other one so as to compensate for the first change and maintain the heat loss constant. It is also seen from the analysis that the inter-relations of the three fundamental physical constants are very complex. Humidity and temperature each enter the analysis in three different and independent ways and velocity of movement enters twice. The full solution, therefore, requires an extensive investigation under controllable conditions and a determination of the relation of each variable to the total result, the other variables being maintained constant.

This is the scope of a laboratory investigation which was begun a year ago at the Sanitary Research Laboratory of the Massachusetts Institute of Technology, and is being continued this year in coöperation with the New York Commission on Ventilation.

We have undertaken to determine as a first step in the solution of the major problem, the rate of heat loss from moist warm surfaces under all conditions of humidity, temperature, and velocity of movement. The experiment is so planned that each of the three fundamental variables may be studied by itself over a wide range, the other two meanwhile being held constant.

VENTILATION INVESTIGATION.

D. D. KIMBALL.*

Read before the Section on Vital Statistics, American Public Health Association, Colorado Springs, September, 1913.

In a paper presented by the author at the meeting of the American Society of Heating and Ventilating Engineers in January, 1912, the phases of ventilation demanding most serious study were summarized as follows:

1. Volume of air. Our present standards are questioned. By a proper study of temperature or humidity could they be decreased or should they be increased?

2. Temperature. Our present standard (68° for the school room and home) is said to be too high. Shall it be lowered and, if so, to what point?

3. Variation of temperature. A periodical reduction of temperature is said to be desirable.

4. Humidity. Is artificial humidification of occupied apartments desirable, and, if so, to what degree?

5. Movement of air. This is said to be desirable. When can it be employed and to what extent can it be carried without involving injurious drafts? What of a frequent "flushing out" or perflation?

6. Heating of air. May the air be harmed or in any way affected in the process (assuming the air to be free from dust)?

7. Cooling of air. Is this desirable in occupied apartments and will it involve undesirable attending features?

8. Dust. It is stated that dust is extremely harmful. What is its effect, how best eliminated, and how generally should such means be employed?

9. Organic matter from the breath or body. Its nature and effect.

10. Chemistry of the air. Is there anything connected therewith worthy of further investigation? What of ozone?

11. Relation of ventilation to exercise and work.

12. Methods of determinating the effect of ventilation and its different elements upon the individual.

A consideration of what has been done towards the solution of these problems and of tests and investigations which have been and are being conducted looking to the solution of these problems is most interesting.

A conference on the subject of ventilation held on the evening of August 26, at the Hotel Iroquois at Buffalo, in connection with the Fourth International Congress on School Hygiene, brought out some interesting conclusions as to the different phases of the problem of ventilation.

This meeting was attended by forty men prominent in ventilation investigations and the subject was thoroughly discussed in all its varying phases. As to air volume, it seemed to be the consensus of opinion that the volume of air in itself was not an important factor in ventilation but that a certain volume of air was essential in densely occupied rooms for the elimination of heat and moisture and for the maintenance of air movement. It also seemed to be generally agreed that ventilation bears no relation to respiration.

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It was generally agreed that oxygen, within the limits usually found in connection with ventilation work has no practical bearing on the problem of ventilation.

It was agreed, also, that CO_2 has no special importance in connection with this problem. There are those, however, who still regard it as a reliable index to the ventilation of the air and an index of the extent of air renewal.

There can be no doubt that when CO_2 is found present in the air of a moving picture theatre in the proportion of 42 to 70 parts in 10,000, as has been found in the Chicago theatre investigations, this may be regarded as satisfactory indication that the air supplied is seriously deficient.

On the subject of odors there seems to be no authority for regarding odors as harmful, but for æsthetic and psychological reasons it is agreed that odors should bè eliminated from the air used for breathing.

As to organic matter, at present it seems to be regarded that the possible harmfulness of organic matter from the breath of body is not proven, the burden of proof resting on those who feel or claim there may be harm therein.

On the subject of bacteria, it is now agreed that there is little or no danger of ærial infection and that ventilation will in no way lesson the danger of infection. At the same time, Haldane's showing of 256 bacteria per cubic foot of air in an unventilated room compared to practically none in the ventilated room is worthy of serious consideration.

As to dust, while it is agreed that it is desirable from an æsthetic point of view that the air for breathing purposes should be free of dust, there is no agreement as to the exact effect of dust on its danger to health. There are those who feel strongly that it is a serious element of danger and this problem should be cleared up.

The much discussed question of humidity still remains undetermined although there seems to be an approach to an agreement that a relative humidity of less than 30 per cent. or 35 per cent. is injurious and that a relative humidity of 50 per cent. is as high as is desirable, although a relative humidity as high as 70 per cent. with a temperature of 70° involves no harm. In this connection tests made at Lewis Institute in Chicago are noted as evidencing the effect of humidity. In these tests it was found that with a humidity of 25 per cent. the pupils were alert for the first part of the first hour and then became stupid. With the humidity raised to 45 per cent. to 50 per cent. the efficiency of the pupils returned. When the humidity was raised beyond this point the pupils again became stupid and headaches developed.

In connection with the subject of humidity it is agreed that humidity and temperature are intimately linked together and that the question of temperature may not be determined independently of the question of humidity. However, there seems to be a general agreement that the temperature standards of the past have been higher than are desirable. The generally accepted modern standard for school-room work seems to be tending toward 65°. Dr. J. H. McCurdy seems to have established that for gymnasia work the desirable temperature is 60° to 61° with 50 per cent. relative humidity.

There seems to be very little disposition to dispute Doctor Gulick's suggestion that a variation of temperature is as desirable inside of buildings as in the outside atmosphere. The necessity of movement of air is entirely agreed to as being essential to the removal of the body envelope of hot moist air.

At the conference above referred to, in connection with the discussion on humidity, Doctor McCurdy raised the question as to whether the expired air was saturated and at body temperature under all conditions of outside temperature and humidity. Also as to the effect of dry air on the membrane of the respiratory passages. This question was not answered at this conferene, and may have such bearings on the question of artificial humidification as to make it worthy of serious study.

The opinion was given that human beings could not live in an atmosphere of 89° or 90° wet bulb temperature or above.

The use of ozone in connection with ventilation work, especially for the purpose of destroying odors is receiving more attention than heretofore. There seems to be no evidence of any intention to claim anything more for ozone than its value as a method of eliminating odors. The quantity of ozone recommended for this purpose is 20 milligrams of ozone per hour for the average mechanic and 16 milligrams per hour for a school pupil.

The interest manifested at this time in the study and investigation of the problems of ventilation is most encouraging and augurs well for an early solution of this important problem. It seems especially desirable at this time that a collection and correlation of all of the data secured in the investigations which have been and are being made should be undertaken. Such a coöperation would do much to clear up the misunderstandings and doubt surrounding this question. For this purpose, the offices of the newly appointed New York Ventilation Commission are volunteered.

It is probably the only investigating body now at work on this problem which is provided with means (both in a financial sense and in the sense of having a sufficient organization) to properly carry out such a plan and to carry on investigation and research work aiming to prove or disapprove the varying theories advanced, and to undertake such further experiments or investigations as may be necessary to fill in the voids between experiments previously or concurrently made by other investigators, or to do such other experimental and research work as may be necessary to complete the solution of a many sided and perplexing question.

Through the generosity of Mrs. Elizabeth Milbank Anderson, the New York Association for Improving the Condition of the Poor has been provided with a fund of $50,000, or such a portion thereof as may be required, to cover the expense of a thorough study and investigation of this problem. At the suggestion of this association Governor Sulzer appointed the following gentlemen as members of the commission: Prof. C.-E. A. Winslow, Prof. F. S. Lee, Dr. J. A. Miller, Prof. E. L. Thorndike, Prof. E. B. Phelps, D. D. Kimball.

The problem involves public health, psychological, medical, physiological, laboratory and engineering phases, and, therefore, an expert in each of these branches is included in the make-up of the commission.

An office of the commission and laboratories have been secured at the College of the city of New York. Two adjacent rooms are available, one of which is to be used as a control room and the other as an observation room, although subjects under observation may be placed in either or both of the rooms, with the same or different atmospheric conditions in the two rooms.

These rooms are inside rooms, lighted from the ceiling, so located as to be entirely unaffected by outside weather conditions. In the control room there is now being installed a complete model or experimental ventilating plant, including a motor-driven fan supplying fresh air which is to be taken in through the roof. From this fan the air will pass over heating coils and thence through an air washer and humidifier, or through a dryer, and from either of these devices, as desired, or in mixed quantities from both, the air passes over reheaters which may or may not be in operation, and thence into the two rooms. The system is divided into two parts, each part serving one of the rooms, so that the atmospheric conditions in the two rooms may be different or the same, as willed, for the purpose of making comparative tests. Temperatures ranging from that of out-of-doors to 100° in zero weather and humidities ranging from nothing to saturation can be provided in these rooms.

The air may enter or be exhausted from the observation room at any or all of four levels in the height of the room.

Another fan, with direct connected motor, is provided for maintaining an exhaust from both rooms. This may discharge out through another portion of the building or back into the intake duct for tests on recirculated air.

Speed control devices are provided in connection with the motors, so that any quality of air may be supplied or exhausted, from 800 cubic feet per minute (400 for each room), down to practically nothing.

An elaborate system of automatic temperature and humidity controlling devices is provided to maintain any desired temperature and humidity conditions in both rooms.

Provision is also made for the installation of disc fans to provide air currents as desired.

Provision is also made for the introduction of ozone or ozonized air at various points of the system or directly into the rooms. Observation and measuring openings are provided.

The system is so arranged that there may be readily combined therewith a cooling plant for experimentation in artificial cooling.

The atmospheric conditions in the observation room will be controlled entirely from the control room. Direct means of communication are provided between the two rooms.

A complete outfit of instruments is being provided, including several Petterson and Palmquist CO^2 determining machines (Roger's modified pattern), sling psychrometers, wet and dry bulb thermometers (direct reading and recording), Pitot tubes, anemometers, ergometers, etc.

Auxiliary to the above apparatus three animal cages are provided, two to be located in the observation room, and one in the control room, so arranged that different atmospheric conditions may be maintained in each.

This plant will be used in an effort to determine the effect of any possible chemical or physical condition of the atmosphere upon human or animal subjects. Both physcial and psychological effects will be measured, mental and physical tests being applied. Blood pressure, pulse and respiration rates, bodily temperature and other desirable measurements and records will be made.

Supplementary to the work done in this laboratory other experiments will be conducted in a respiration calorimeter to be constructed by the commission at the College of Physicians and Surgeons.

For the purpose of a practical application of the results of the experiments above contemplated arrangements have been concluded to install an experimental ventilating plant in two rooms of a new school building in New York. These rooms will be so arranged that air may be supplied through the ceiling or floor, immediately at the desk, or through either of two of the walls of both rooms. Likewise, the air may be exhausted through floor or ceiling or through either of the two walls. Window ventilation may be tested here also. Two similar rooms occupied by a similar class of pupils will be used as controls.

In coöperation with this commission, Dr. J. H. McCurdy, at the International Y. M. C. A. College, at Springfield, Mass., will continue and extend his experiments of the last two years with recirculated air. Also Professor Phelps will continue at the Massachusetts Institute of Technology his experiments upon moisture elimination and absorption, the effect of different clothing materials, and the study of other physical problems. Other tests and experiments in coöperation with the commission are being arranged. Open air school and hospitals will be studied.

This commission seeks and offers coöperation from and with all who are investigating this important problem. It is believed that much time may be thus saved in reaching satisfactory results, and that the work of every investigator will be greatly facilitated.

During the last two years a most interesting and extended experiment upon the use of recirculated air has been conducted at the International Y. M. C. A. College, under the immediate supervision of Dr. J. B. McCurdy, and Prof. G. B. Affleck. During the heating season of 1912–13 a serious effort was made to cover as many phases of the problem as possible. To this end a voluntary association was formed to coöperate with Doctor McCurdy and Professor Affleck, including Prof. G. C. Whipple, Mr. M. C. Whipple, Prof. C.-E. A. Winslow, Mr. C. E. Pearce and the author. The air, when recirculated, was passed through an air washer and special attention was given by Mr. Whipple to chemical and microscopical studies of the water and air. Mr. Whipple performed a vast amount of work, both at the college and in his laboratory at Harvard University, the results of which he can give in detail.

Messrs. Horne, Knapp and Geer, seniors at the college, gave valuable assistance throughout the season by making and recording carbon dioxide, temperature and humidity tests, and also "comfort" records of the students. Some very conclusive data as to the most comfortable atmospheric conditions in gymnasia were obtained.

While it may not be stated as a result of these investigations that the recirculated air, when washed, is as good as outside air when washed, it is apparently better than outside air unwashed, being freer from dust and bacteria and not appreciably less in oxygen or higher in carbon dioxide. Increased efficiency in air washing apparatus will improve the quality of the recirculated and washed air.

The fact that the use of recirculated air for ventilating purposes (assuming that its quality is found to be entirely suitable) makes possible a reduction in coal consumption of approximately two thirds or, in other words, makes ventilation possible without greater expenditure for fuel than that required for direct heating without ventilation, makes the study of recirculated air a most worthy one. Such a reduction in operating costs would eliminate one of the serious objections to the artificial ventilating system.

The cost of installing the ventilating system is practically the same whether the air be recirculated or not.

Another set of most interesting tests of the possibilities of recirculated air is that of Professor Bass of the University of Minnesota, made in the Jackson School in Minneapolis.

Extensive investigations in ventilations have been conducted during the past year by the Chicago Ventilation Commission.

It is interesting to note from the conclusions of this commission in connection with its investigations into theatre ventilation that they regard 25 cubic feet of air per person as a minimum which will give satisfactory results in theatre ventilation; that the amount of moisture in the air in a theatre never becomes low enough to require artificial humidification; that temperatures from 55° to 75° is neither uncomfortable nor injurious; that the number of dust particles is inversely proportioned to the amount of fresh air supplied; that ordinary air washers removes from 20 per cent. to 70 per cent. of the dust; that the so-called convection currents arising from the bodies of occupants may be disregarded with mechanical ventilation, and that exhaust systems of ventilation are of value only in connection with a positive air supply.

Among other experiments made or contemplated may be mentioned those on ozone in the Schenectady schools; a few tests on school-room ventilation in Boston, New York, Toledo and elsewhere; tests on factory ventilation by Dr. C. T. Graham-Rogers, and the extended study made by Professor Winslow and Professor Baskerville on existing atmospheric conditions in New York City schools, these studies covering both the artificially and naturally ventilated school-rooms. In connection with these studies it is to be noted that the best of the artificially ventilated rooms was found to be as good or better than the best of the window ventilated rooms. Every school-room may, with a proper equipment and a good janitor for the building, be kept at all times as well ventilated as the best ventilated room found, while weather conditions, varying winds, and the impossibility of securing proper attention on the part of the average teacher to the matter of ventilation, in addition to other duties, makes impossible satisfactory ventilation by means of windows, except in rare cases. It should be vastly easier to get one man per building capable of operating a ventilating plant than twenty to fifty teachers.

One of the most important, perhaps the most practical if not the most serious, phase of the problem of ventilation, rarely receives consideration in gatherings of this nature, is little appreciated by the student or investigator of ventilation, and of it probably little is known by those most concerned or those directly responsible for school building construction. It is a fact that the chief reason for the failure of the artificial ventilating system is not lack of information as to desirable atmospheric conditions or the inability of the engineer to provide the same, but the attitude of the school boards, building committees and school architects towards the matter of a sufficient expenditure for a complete ventilating plant.

The first responsibility lies with the school boards or their building committees because of their failure to see that the sum allowed for the ventilating plant is sufficient to give the best that science can devise; to see that the architect does not use any of the money which should be spent on the ventilating plant in the enlargement or ornamentation of the building. Criticism of the architect is not intended in the statement that in not one school building in ten is the engineer allowed to work out what he knows to be the best possible ventilating plant for the building. The vast majority of plants are the result of a compromise (some of them very poor ones from the standpoint of the engineer) between the request of the engineer for freedom to design the right thing and the insistance of the architect (who is usually in charge of the work) that the amount allowed for ventilation shall be the very minimum so that he may meet the demands of the committee (often most unreasonable) for more space or equipment than can be properly provided for the appropriation granted.

The engineer is very often obliged to put one radiator in a room where two or three would be much better; is usually obliged to omit air washers and humidifying systems; sometimes is obliged to omit temperature controlling devices, and frequently is obliged to use inferior materials. And all to enable the architect to give to the board a building as big as he promised, or as big as some other architect offered, or a building as big or pretentious as the citizens expect, or a building as cheaply built per cubic foot as some other supposedly "similar" building in the same, or a neighboring city.

Similarly, through the employment of cheap janitors, many good ventilating systems are rendered inefficient. The employment of capable janitors, paid proper wages, will not only bring about the better operation of the plant but a sufficient reduction in fuel costs to more than pay the increased salary.

Unless the authorities can be made to see the seriousness of these phases of the problem and these difficulties can be eliminated, all of the good work in investigations which is being done will go for absolutely naught, for if the schools do not now get the best that may be had, what hope is there that they will get better when better becomes known?

AN EXPERIMENT WITH OZONE IN SCHOOL VENTILATION.

Frederic Bass.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913

The purpose of this paper is to briefly give the data and results of an experiment in school ventilation, using apparatus which was described before the Engineering Section of the American Public Health Association at the last annual convention and published in the April number of the Journal.

The apparatus used may be briefly described as follows: A typical school room on the first floor of a fifteen-room building was selected. The air delivered to the room was taken through a window in the basement, passed over tempering coils through an air washer, thence through heating coils or a by-pass and blown to the room by a fan. The air was delivered into the room through inlets located at the front of the top of each desk, thus giving each pupil an individual supply of air. The velocity of the air at the center of the jet where it came in contact with the body of the pupil was about one and one-half linear feet per second. Air was also admitted to the room along the top of the blackboards. The air was removed at the ceiling through multiple outlets connected with an exhaust fan. It was possible to exhaust this air to the outside or return it to the room.

It was determined to experiment upon the effect of recirculated air in connection with the use of ozone, so the air returning from the room was treated with ozone in the proportion of one part of ozone to one million parts of air. During the test the quantity of air furnished amounted to approximately 8.5 cubic feet of air per minute per pupil. The characteristic odor of ozone was barely perceptible in the room, and apparently kept the air in an acceptable and pleasant condition, for there was no complaint on the part of the teacher or the pupils who were perfectly satisfied with the condition of the room, and who did not know that the air was being recirculated. Upon entering the room from the hall of the school, one would notice the ozone rather than the unpleasant odor usually present. After being in the room for a few moments, one became accustomed to this odor as to any other; however, upon returning to the hall, the distinctive school house odor was quite noticeable.

A group of pupils in the room described was selected for physiological and psychological tests. A control group of pupils of the same grade and general characteristics of race and living conditions was selected in a nearby school, where the ordinary fan system was delivering about thirty cubic feet of outside air per minute per pupil.

Physical records, including measurements of air volumes, temperatures and humidities, were kept. Physiological observations included bodily temperatures and blood pressures. Psychological tests, consisting of division, substitution and motor tests, were made.

The pupils were examined at the beginning and at the end of a three weeks' run, each time the averages of three days' observations being taken. The results of the study indicate that there was no significant difference in the physical or mental progress of the two groups of pupils. The physiological examinations, although performed by a competent physician, were insufficient in scope and proved nothing. The psychological tests, however, were carefully analyzed and found to be well suited for an experiment of this character. The problems in short division involved a high type of selective thinking and memory processes. The substitution tests were partly mental and partly motor. The motor tests consisted of a movement of the index finger, the number of movements being registered in a specially constructed ergometer. The work done in these tests was examined with reference to total amount, rate of improvement and rate of fatigue, and in all respects the work of the test group showed a parallelism with that of the control group. One interesting discrepancy was noted during the tests. The work in division showed a 64 per cent. improvement in the test group against a 25 per cent. improvement in the control group. The other tests did not seem to warrant this improvement and upon examination it was found that the test group was being coached by the teacher who knew that some sort of competition was on, and wanted to be sure that her pupils were going to win out.

The conclusions to be drawn from these tests are interesting. It was shown that under the conditions of an average school house it was possible to recirculate and renew the air for three weeks with satisfactory results from æsthetic and hygienic standpoints.

The average temperature of the room was 68.8 degrees F.; the humidity averaged 32.6 per cent. The air was kept in motion and was free from disagreeable odors, and the room was perfectly comfortable at all times except upon one occasion when the small fan supplying ozone to the room failed and the difference was immediately noticeable, for the teacher soon called attention to the fact that something was wrong with the air, although she did not know the cause. Apparently the ozone was an important factor in keeping the air of the room in a comfortable condition.

No particular attempts were made during this test to control the humidity which was fairly constant and moderate at all times, but the temperature of the room was controlled by thermostats. There was in this room an undetermined amount of air leakage possibly amounting to as much as two changes of air per hour, which is not an unusual amount, but this would be operative irrespective of the type of ventilating system employed. Recirculated and renewed air would, of course, be impossible with slight difference of inside and outside temperatures unless the windows were raised, but the differences of inside and outside temperature amounting to thirty degrees and upward, recirculation of the air, judging from the results here obtained, is apparently as good a method of ventilation as the use of outside air, provided proper control of the condition of the air is exercised. The most important reason for recirculating air is that of economy and this factor would be most important in a cold climate.

Particular attention should probably be given to the fact that each occupant of the room was furnished but 8.5 cubic feet of air per minute, as against 30 cubic feet of air per minute in the other building. This reduced quantity of air was possible only on account of the method of distribution by means of which each pupil was certain to receive his proper portion of the air and that direct from the inlet into the room. If recirculated air were to be used with the standard system of ducts, that is to say, with a single inlet and outlet into the room, a larger quantity of air would undoubtedly be necessary.

It would seem to the writer that the time has come when the old standards of ventilation and methods of ventilating practice resting primarily upon quantity of air should be replaced by new standards depending upon quality of air and methods of distribution in the room.

Note: Since writing this paper, several articles on the physiological effect of ozone have been published. Attention has been directed to the fact that the ozone probably has the effect of masking odors rather than destroying the cause of the odors. The injurious effect of ozone in high concentrations is also pointed out, as well as the possibility of an injurious effect from the long continued use of ozone in low concentrations. Two interesting papers are: Konrich, Zeitschrift für Hygiene, vol. 72, p. 476; and Jordan and Carlson, Jour. A. M. A. September 27, 1913.

In the experiments conducted by the writer, no injurious or unpleasant effects were experienced by the occupants of the room in a period of three weeks.

SOME PRELIMINARY STUDIES IN AIR WASHING AND ITS RESULTS.

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and

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Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs September, 1913.

Clean air in motion and of proper temperature and humidity is necessary to indoor comfort. This is, perhaps, as succinct a statement as can be made of atmospheric requirements according to modern views. Our concepts of ventilation are undergoing a change. Slight reductions in the amount of oxygen or slight increases in the amount of carbonic acid in the air we breathe are no longer feared. The human body can automatically adapt itself to slight changes in the proportion of these gases. It is more difficult for the body to adapt itself to temperature changes and these may cause more or less discomfort and damage. The heat relations of the body are complicated, involving heat production within the body, affected by food and by physical and mental exercise; heat transference within the body from the interior to the surface; and heat elimination at the surface, for human beings live normally in an atmosphere cooler than the body. Heat elimination is itself a complicated matter: it is lost by conduction, by convection, by radiation; it is affected by the temperature and humidity of the air, by the clothing worn, by the perspiration produced and evaporated. So complicated are these relations that we have not yet solved them. We do not yet know the best combination of indoor temperature and humidity for our greatest bodily comfort and efficiency.

We do know, however, as a matter of universal experience that it is uncomfortable to remain in air that is still, or as we say that is "dead." If the air that we exhale remains so near our faces that we re-breathe a considerable portion of it at each succeeding breath a feeling of oppression and discomfort ensues. Air stagnation also forms an atmospheric cloak about our bodies which affects their heat conditions. Mere stirring of air often changes discomfort to comparative comfort; witness the effect of the introduction of fans in the New York subway cars. The benefits of sleeping in a cold room in which the warm exhaled air quickly rises so that the next breath is new air, and the benefits of outdoor sleeping are due in great measure to the motion of the air. No system of ventilation can be regarded as satisfactory that does not cause a sufficient circulation of the air.

Another thing that we need to appreciate is that the air which we breathe should be clean. So anxious have we been in the past to make sure that the carbonic acid did not exceed some illogical, arbitrary standard that we have overlooked this most patent and obvious need. Of course, the extremes of this quality of cleanliness have been recognized. We know that people who work at dusty trades, in dust laden air sicken and die of diseases that gain a foothold in the lungs; and we send our sick to the mountains and the seashore and spend our vacations in the relatively clean air of the woods and fields and upon the waters. Cleanliness is the great thing to be desired in air as it is in water. From time immemorial water that is grossly foul has been regarded as dangerous, but it is only within a generation or so that water which is only moderately contaminated has been regarded as dangerous. A clean water supply is now a watchword of our modern cities. If precedent is followed we shall come to regard as undesirable much of the air that would not by present day standards be called unclean, as well as air that is grossly laden with dust and foul gases.

Modern cities are dust producers. Streets and pavements and even sidewalks are worn by friction of the traffic, especially in this age of the railroad and automobile; car wheels are ground to metallic dust; fabrics turn to lint; fuel burns with products of smoke and ashes. Dust is being continually produced both within and without our factories and houses.

Recent studies made by us in several cities have shown that the number of dust particles in the air just above the sidewalk is very large, even on quiet days. At the air inlets of some of the commercial buildings in Boston the numbers of particles, as determined by microscopical counts, ranged from 100,000 to nearly 1,000,000 per cubic foot of air. With active wind movement the numbers are probably much higher, but even with the lesser number mentioned the number of particles inhaled by a person in an hour would be a million and a half. To be sure the particles making up this vast number are very tiny, ranging from 0.5 to 15 microns in diameter, with an average of about 3 microns (.003 millimeter), and their combined bulk is not large.

Air contains more dust near the street level than at higher elevations. Tests made on May 13, 1913, at the South Terminal Station, Boston, where air is taken in at the roof, showed lower dust counts than air taken at the street level at various office buildings in the business districts of Boston. Tests made at the John Hancock Building on June 6, 1913, showed that at the street level the air contained 483,000 dust particles per cubic foot, at the fifth story there were 233,000; and at the tenth story, 140,000 per cubic foot. Tests made on July 2, 1913, in New York at the Metropolitan Life Insurance Building and the Woolworth Building, the last named being the highest building in the world, showed similar reductions in the amount of dust in the air in the upper stories. For example, at the Woolworth Building the air at the street level contained 221,000 dust particles per cubic foot; at the tenth story there were 85,000 at the thirtieth story 70,000, and at the fifty-seventh story 27,000. The dust counts at the Metropolitan Building were somewhat lower than at the Woolworth Building, the number at the street level being 173,000, and at the fiftieth story 21,000 per cubic foot. The lower counts at the Metropolitan Life Building may possibly have been due to the fact that this building is situated near Madison Square and is more isolated than the Woolworth Building which is located downtown in a more crowded section. Both sets of observations were made on warm quiet days.

TABLE I.

TABLE SHOWING THE NUMBER OF DUST PARTICLES PER CUBIC FOOT AT DIFFERENT ELEVATIONS IN VARIOUS WELL-KNOWN HIGH BUILDINGS IN NEW YORK AND BOSTON.

Floor.	Boston, Mass.	New York City.		
	John Hancock Building.	42d Street Building.	Metropolitan Life Building.	Woolworth Building.
	June 5, 1913. 2.50–5.35 P.M.	July 3, 1913. 2.25–4.40 P.M.	July 2, 1913. 2.55–5.15 P.M.	July 2, 1913. 10.10–12.40 A.M.
	Number of Dust Particles per Cubic Foot.			
Sidewalk	483,000	....	173,000	221,000
2d	306,000	122,000	94,000	163,000
3d	300,000	104,000	71,000	....
5th	233,000	70,000	51,300	111,000
7th	139,000	49,600	50,000	109,000
10th	140,000	....	38,000	85,000
11th	....	37,600	....	....
14th	....	34,000	....	....
20th	....	32,300	36,300	75,000
30th	....	....	33,300	70,000
40th	....	....	24,000	41,300
50th*	....	....	21,000	....
57th†	....	....	....	27,300

*662 feet high.

†716 feet high

Winslow has shown that the air of many of the New York schools contains even larger numbers of dust particles than those above mentioned, ranging from 400,000 to 1,000,000 per cubic foot. Studies by the authors at the gymnasium of the International Y. M. C. A. College at Springfield, Mass., have likewise shown that the indoor air contains dust particles in numbers usually more than 100,000 and sometimes even 400,000 per cubic foot. Such results are naturally to be expected, for indoor air is merely the outer air drawn in through the ventilating ducts, the inlets to which are often badly located, while to this outer air is added the dust resulting from friction and air movement of various kinds indoors.

Unclean air contains bacteria and other living organisms as well as lifeless dust particles. The bacteria are usually much less numerous than the dust particles. Our investigations at the John Hancock Building show that at the street level the air contained 1,330 bacteria per cubic foot capable of developing on gelatin at 20° in 96 hours, while at the tenth story the air contained 330 per cubic foot. Speaking broadly it was found that there were from 200 to 300 times as many particles of dust as bacteria. The bacteria capable of growing at the temperature of the human body were still less numerous, there being only 30 such bacteria per cubic foot found at the street level and 17 at the tenth story. The sample from the third story, however, contained 83 per cubic foot, evidently an erratic observation. No attempt was made to determine the particular species of bacteria in these samples, but tests were made for the presence of B. coli and only once was this organism found, namely, in the sample collected at the third story. Molds were also present to the extent of 20 per cubic foot at the street level and 3 at the tenth story.

TABLE II.

TABLE SHOWING THE NUMBER OF BACTERIA AND DUST PARTICLES IN AIR TAKEN AT DIFFERENT ELEVATIONS FROM JOHN HANCOCK BUILDING, BOSTON, MASS., JUNE 5, 1913.

Floor.	Bacteria per Cu. Ft.		B. Coli.	Moulds per Cu. Ft.	Dust Particle per Cu. Ft.
	Gel. at 20°.	Agar at 38°.			
Sidewalk.......	1,330	30	0	20	483,000
2d...........	1,200	37	0	13	306,000
3d...........	417	83	+	8	300,000
5th...........	720	43	0	15	233,000
7th...........	310	33	0	10	139,000
10th...........	330	17	0	3	140,300

Winslow's studies of bacteria in the air of rooms, and especially in the air of sewers and drains, showed a conspicuous absence of pathogenic bacteria. Even in the case of sewer air and drain air the numbers of B. coli found were surprisingly small. Our own results corroborate Winslow's findings. Yet in air, just as in water, B. coli may be regarded as an index of undesirable contamination. In this connection it will be remembered that Doctor Chapin, the well known health officer of Providence, R. I., holds that the danger of transmission of disease by the air conveyance of bacteria is extremely small.

Dust and bacteria do not constitute the only undesirable substances found in unclean air. Chemical examinations of the water from air washers in Boston disclosed the presence of ammonia compounds, nitrites, chlorides, sulphates, free sulphuric acid, and iron. The amounts of these substances varied with the location of the intake ducts. Washers receiving air from the street level showed greater quantities of impurities in the water used for washing than those taking air from a height.

Mention has been made of the dust particles and bacteria in indoor air and of their tendency to outnumber those in outdoor air. The other constituents of indoor air are likewise subject to change. Chief among these are the substances that give rise to odors. Everyone is familiar with the odor of a poorly ventilated room after occupancy by a number of persons. This is due in part to the presence of expired air and to body emanations that accompany physiological processes. The same condition prevails wherever people congregate in restricted quarters, such as halls, churches, theatres, and cars. To some extent the intensity of these disagreeable odors is dependent upon the degree of activity of the occupants: witness the characteristically strong odor of a gymnasium. During the course of the Springfield experiments an increase of the odor of the air after the men began exercising in the gymnasium was very noticeable to one standing in the exhaust air duct.

There is no expression more common than that of "fresh air." Just what is meant by this term? It certainly does not involve the factor of air temperature to any extent, for we use the expression both in winter and in summer, and at times when the outside and indoor temperatures are the same. Neither does it involve humidity. In the opinion of the writers it may be regarded as practically synonymous with clean air in motion, air that is free from dust, from bacteria, and from malodorous or offensive organic emanations and poisonous substances.

Too little attention has been paid in the past to the cleanliness of the air supplied to our buildings. Fresh air inlets are often located with the grossest disregard for the quality of the incoming air. It is not uncommon to see them placed on the sidewalk level, or facing a vacant piece of ground that is swept by clouds of dust, or where smoke or objectionable odors may be taken in. In one of the buildings of Harvard University the air inlet is placed near a main entrance where automobiles stop and start, and the odor of spent gasoline frequently permeates the building.

The effect of forcing unclean air into buildings is to nullify the result aimed at by ventilation, that is to provide a supply of fresh air. The presence of dust, bacteria and odors not only renders the conditions uncomfortable and deleterious to health but it results in attempts at window ventilation, and this means poor ventilation, unequal heat distribution and draughts.

Supplying buildings with unclean air may often be obviated by a judicious choice of location for the inlet duct. A change of location from near the street to some higher point, or from one side of a building to another may greatly improve the quality of the influent air.

Crowded buildings and dusty city streets will often render it impossible to secure clean air from the outdoor atmosphere, without resorting to artificial purification. Fortunately this purification can be accomplished. Just as unclean water may be made wholesome by the employment of Nature's process of filtration, so can unclean air be purified by the application of another efficient process of Nature, namely air washing. The purifying effect upon atmospheric air of a heavy fall of rain is well known. A shower is said to freshen the air. Not only are suspended particles removed, such as dust and bacteria, but gaseous impurities, such as acid and ammoniacal vapors are dissolved and removed, leaving the air sweet and clean. A determination of dust particles in the air after a heavy rain at Harvard University showed only 25,000 particles per cubic foot, whereas in dusty weather the numbers would have been measured by hundreds of thousands. This figure compares favorably with a determination made over the water of Long Island Sound at a point several miles from the shore, when the air contained 18,000 dust particles per cubic foot.

To ascertain the efficiency of air washing as a means of purification the authors made a study of this method as carried on at several buildings in Boston and Springfield, Mass.

The process of air washing consists of passing the air horizontally through a chamber in which water is falling in drops, as rain, or into which it is sprayed. The sprays are obtained by forcing the water out of perforated pipes or through nozzles placed across the ducts. When the sprays intersect they are said to form a curtain. The object is to bring the air and water into intimate contact. Besides the washing chamber there are heating or tempering coils in the ducts or in a separate chamber, and devices for controlling temperature, a primary object of air washing in the past having been that of conditioning the air with respect to its temperature and humidity. The water used for washing is circulated by means of a pump so that it may be used over and over in the spray chamber for a considerable time. If desired this water may be cooled so as to influence the temperature of the air. Several forms of air washers are on the market, essentially similar in principle but differing in details of construction.

Although it has been known that air washers tended to clean the air, and they have sometimes been introduced for that very purpose, their efficiency as a means of air purification has not been determined. Accordingly the authors undertook a few preliminary studies in order to get data to serve as a guide in planning a more complete investigation. These studies were made at certain installations in Boston and Springfield, where washers made by different companies are in use and included chemical and bacteriological analysis of the air before and after washing, an analyses of the water before its use and after different periods of use. At Springfield the studies formed a part of a more extensive series of ventilation studies made at the gymnasium of the International Y. M. C. A. College during the winter and spring months.

The washers in Boston referred to by the letters A, B, C, D, and E were supplied with air taken from inlets placed as follows. They were all in the business district.

Washer.	*Position of Inlet.*
A	Eighth story on the roof.
B	Above street entrance.
C	Second story, back side of the building.
D	Street level, just above sidewalk.
E	Street level, just above sidewalk.

The analysis of air and water were made by the standard methods of the American Public Health Association supplemented by the use of special apparatus. The results are given in Tables III and IV.

Comparison of the dust counts in the air before and after passing through the water showed that in the case of the five Boston washers the percentage removal ranged from 27 per cent. to 87 per cent. and averaged 54 per cent., while the removal of bacteria ranged from 37 per cent. to 88 per cent. and averaged 64 per cent. Generalizing from the data given in Table III it is fair to say that the air washing process as practised removed about two thirds of the suspended particles,—including dust, bacteria and molds.

The nature of the substances removed by the washers is shown by Table IV. Quantitatively these figures mean little, apart from a knowledge of the volume of water used and the number of times that the same water had passed through the air, and exact data for this could not be obtained. From a comparison of the analyses of the tap water before use with the washer water after use it is evident that many substances were removed from the air besides dust and bacteria.

When street air was passed through a washer it required but a few hours for the water used to resemble sewage in appearance and analysis. A comparison of the analyses of washers B, D, and E, with those of C and A given in Table V shows how much greater was the amount of dust removed from air near the street level than at higher elevations. The intake ducts of these washers were at the street level, the second story, and the eighth story respectively.

TABLE III.

TABLE SHOWING REMOVAL OF BACTERIA AND DUST PARTICLES FROM AIR BY VARIOUS AIR WASHERS, BOSTON, MASS.

Source of Sample of Air.	Date 1913.	Bacteria per Cu. Ft.				Moulds per Cu. Ft. (Gelatine.)	Dust Particles per Cu. Ft.	
		Gelatine at 20°.		Litmus Agar at 38°.				
		Number.	Per Cent. Remov'l.	Number.	Per Cent. Remov'l.		Number.	Per Cent. Remov'l.
Washer A								
Outside . . .	Feb. 3	10		0		10	229,600	
Washed . .	"	5	50%	0	. . . . .	0	30,500	87%
Outside . .	Feb. 10	110		0		8	111,100	
Washed . .	"	13	88%	0	. . . . .	3	58,000	48%
Outside . .	May 13	1,000		7		20	178,300	
Washed . .	"	300	66%	7	0%	7	124,700	30%
Washer B								
Outside . .	Feb. 10	27		17		10	158,300	
Washed . .	"	17	37%	7	55%	3	71,300	55%
Washer C								
Outside . .	Mch. 13	13		3		0	248,000	
Washed . .	"	3	77%	0	100%	0	72,000	71%
Washer D								
Outside . .	Mch. 13	57		3		13	241,000	
Washed . .	"	7	88%	3	0%	3	104,000	57%
Washer E								
Outside . .	May 1	187		20		20	729,300	
Washed . .	"	110	41%	7	65%	13	531,000	27%

The presence of sulphurous acids in the air of the business districts of Boston was responsible for an interesting phenomenon. These acids resulted from the formation of sulphurous gases during the combustion of coal and, being soluble, were removed from the air and dissolved by

TABLE IV.

TABLE SHOWING ANALYSIS OF TAP WATER BEFORE USE, AND OF WATER FROM VARIOUS AIR WASHERS IN BOSTON, MASS., AFTER USE.

	Before Use.		After Use.						
	Tap Water.		Washer A.			Washer B.	Washer C.	Washer D.	Washer E.
	1	2	1	2	3				
Date of collection, 1913	Feb. 1	Mch. 13	Feb. 3	Feb. 10	May 13	Feb. 10	Mch. 13	Mch. 13	May 1
Number of hours water had been circulated	......	......	192	360	48	75	24	34	9
Temperature F°	......	......	45°	34°	52°	50°	50°	63°	59°
Turbidity	0	1	3	16	6	35	35	145	28
Color	10	16	15	20	15	17	10	20	39
Odor	2v	1v	3v	3a	3a	3a	2v	3a	3d
Total residue	34.0	40.0	55.0	10.70	96.0	560.0	238.0	765.0	160.0
Loss on ignition	16.0	17.0	13.0	27.0	21.0	151.0	78.0	240.0	46.0
Fixed residue	18.0	23.0	42.0	80.0	75.0	409.0	160.0	525.0	114.0
Kjedahl nitrogen	.190	.168	.228	.580	.220	2.780	.510	1.740	2.650
Albuminoid nitrogen	.068	.084	.084	.132	.106	.332	.136	.850	.425
Free ammonia	.002	.018	.148	.144	.042	1.512	.280	2.350	2.330
Nitrites	.000	.001	.011	.011	.006	.056	.010	.024	.060
Nitrates	.10	.18	.09	.05	.05	2.50	.15	.14	.18
Oxygen consumed	2.5	3.4	3.5	5.5	4.1	10.0	6.2	26.4	8.2
Chlorine	5.0	5.0	5.0	5.2	5.0	16.0	7.0	19.0	10.0
Total hardness	11.0	14.5	20.0	28.5	30.0	307.5	130.0	357.5	45.5
Alkalinity	6.0	7.0	0.0	0.5	0.5	—1.5	—4.5	0.0	—0.5
Incrustants	5.0	7.5	20.0	28.0	29.5	309.0	134.5	357.5	50.0
Iron	0.5	0.2	0.4	1.4	0.7	10.0	7.5	32.0	3.5
Copper	......	......	+*	+	0	+	+	+	0
Total Bacteria									
(Numbers per c.c.)									
Gelatine 4 days at 20° C.	25	50	25	15	1,200	60	0	0	8,700
Litmus agar 2 days at 38° C.	7	..	2	1	3	10	0	0	12
Moulds per c.c. (Gelatine)	5	..	3	5	..	10	..	..	30

* + signifies that copper was present. 0 signifies that copper was absent.

the water in the air washing process. As long as the water contained alkalinity the sulphuric acid was neutralized, but after a certain length of time an excess of acid was present. This condition was found in several washers. Where it occurred in a washer constructed largely of copper the acid dissolved this metal and formed copper sulphate. As a result there was established a sort of automatic process of disinfection, and the numbers of bacteria found in the washer water were very low.

The gymnaisum of the International Y. M. C. A. College at Springfield afforded an opportunity of studying a new phase of the problem of air washing, namely that of purifying air that had passed through an occupied room. It was supplied with air from a ventilating plant provided with an air washer operated at such a rate that the air in the room was changed every nine to twelve minutes. This plant was well adapted for experiment for the reason that air could be taken in from the outside and washed, or the exhaust air from the room could be returned through the washer and again forced into the gymnasium. Comparison could thus be made between the use of outside air and of rewashed air. As in the Boston experiments analyses were made of the air before and after washing and of the water after different periods of service. Frequent tests were made under different conditions of operation. The results appear in Tables VI to X.

TABLE V.

AVERAGE ANALYSIS OF WASHER WATERS.

	Water before Use.	Intake at Street Level.	Intake at 2d Story.	Intake at 8th Story.
	(Results Expressed in Parts per Million.)			
Turbidity	1.	69.	35.	8.
Total residue	37.0	495.0	238.0	86.0
Loss on ignition	17.0	148.0	78.0	20.0
Kjedahl nitrogen	0.179	2.390	0.510	0.343
Free ammonia	0.010	2.064	0.280	0.111
Oxygen consumed	3.0	14.9	6.2	4.4
Iron	.35	15.2	7.5	8.0

When the exhaust air left the gymnasium it had a noticeably sour and musty odor. After passing through the washer this was almost completely removed and the returned air was fresh and sweet. At the same time the "gymnasium odor" was acquired by the washer water and could be easily detected in the sample bottles. The washer water was also found to contain large numbers of bacteria and many epithelial scales derived from the skin of the men exercising on the floor. Dust, bacteria,

TABLE VI.

RESULTS OF A SERIES OF ANALYSIS UPON WATER FROM AIR WASHER, USING RECIRCULATION OF AIR AND WATER.

Determination.	Tap Water.		Washer Water.				
	1.	2.	3.*	4.	5.	6.	7.
	Jan. 13.	Jan. 15.	12 hrs. Jan. 13.	20 hrs. Jan. 15.	29 hrs. Jan. 20.	31 hrs. Jan. 20.	57 hrs. Jan. 29.
	(Results Expressed in Parts per Million.)						
Temperature	....	43°	52°	56°	51°	54°	54°
Turbidity	0	0	6	10	11	11	15
Color	17	15	37	43	70	73	65
Odor	1v	1v	2a	3a	3a	3a	4s 4m †
Total solids	35.0	36.0	48.0	67.0	84.0	95.0	106.0
Loss on ignition	8.0	8.0	16.0	25.0	18.0	22.0	22.0
Fixed solids	27.0	28.0	32.0	42.0	66.0	73.0	84.0
Total organic nitrogen	.032	.046	.220	......	.250	.300	.420
Albuminoid nitrogen	.058	.044	.110	.150	.174	.164	.244
Free ammonia	.004	.002	.954	1.304	1.574	1.608	2.228
Nitrites	.000	.000	.040	.055	.155	.145	.144
Nitrates	.05	.05	.07	.09	.11	.12	.15
Oxygen consumed (5 mins.)	2.6	2.8	4.2	4.5	5.2	5.5	5.9
Chlorine	2.5	2.5	2.7	2.8	3.5	3.5	3.5
Hardness	8.0	6.5	19.5	22.0	30.0	32.5	36.5
Alkalinity	3.5	2.0	14.5	17.5	21.0	22.5	30.5
Incrustants	4.5	4.5	5.0	4.5	9.0	10.0	6.5
Iron	0.15	0.15	1.0	2.2	3.6	4.0	4.4
Free CO_2	3.0	3.0	3.0	3.7	3.5	4.0	4.0
Total Bacteria							
Gelatine, 4 days at 20°	35	44	37,500	85,000	131,000	155,000	180,000
Litmus agar, 2 days at 38°	..	..	....	....	50	50	12
Amorphous matter (Standard units per c.c.)	0	0	730	684	156	246	1,044
Epithelial scales (Number per c.c.)	0	0	14	24	32	32	40

*The first twelve hours were in the nature of a blank run without occupants in the gymnasiums.

†Odor was sour and musty.

molds, nitrogen, and iron were removed from the indoor air by the washer at Springfield to about the same extent as by the washers tested in Boston. The results indicated that under the conditions there existing the exhaust air could be washed and returned to the gymnasium with entire safety and comfort to the occupants of the room and with no apparent sacrifice of wholesome properties. The carbonic acid was not reduced by the air washer,—and theoretically it ought not to be reduced,—but this fact did not at all affect the acceptability of the washed air to the occupants. The details of these experiments are described in *The American Physical Education Review*, October, 1913. Generalizing from these results, it may be said that the recirculated air after washing was cleaner than unwashed outdoor air but was slightly less clean than the outdoor air after washing.

TABLE VII.

COMPARATIVE NUMBERS OF BACTERIA UPON EXPOSED PLATES, USING RECIRCULATION OF AIR AND WATER.

Sample.	Date.	Number Minutes Exposed.	Total Bacteria upon Plate.				Moulds per Plate.
			Gelatine at 20°.		Litmus Agar at 38°.		Gelatine.
			Number.	Per Cent. Removal.	Number.	Per Cent. Removal.	
Using Recirculation	1912						
Exhaust air	12/12	45 sec.	130		18		22
Washed "	"	"	12	91%	2	89%	4
Exhaust "	1/13	2 min.	62		. .		15
Washed "	"	"	7	89%	. .	. . . .	2
Exhaust " 3 P. M.	1/20	1 min.	170		. .		25
Washed " "	"	"	39	77%	. .	. . . .	6
Exhaust " 4 "	"	"	52		21		18
Washed " "	"	"	36	31%	8	62%	6
Exhaust " 3 "	1/29	1 min.	55		49		12
Washed " "	"	"	36	35%	3	39%	11
Exhaust " 4 "	"	"	46		60		7
Washed " "	"	"	30	35%	8	87%	2

The advantage of washing and recirculating the air lies in the great saving of heat in cold weather. Mr. D. D. Kimball, who designed the ventilating plant at Springfield, estimated that when the outdoor temperature was 32° F. the saving in cost of operation effected by recirculating washed air was 40 per cent., while with an outdoor temperature of 0°F., the saving was 50 per cent. The use of less coal at Springfield when the air was being recirculated instead of being drawn in from outdoors was plainly evident and was commented upon by the engineer in charge of the Springfield plant. In the summer the washer may be operated as a

TABLE VIII.

RESULTS OF ANALYSES OF WATER FROM AIR WASHER AFTER SHORT TIME TESTS, USING OUTSIDE AIR AND RECIRCULATED AIR.

Deterimnation.	1. Tap Water.	2. *Washer* Using Outside Air.	3. *Washer* Before Using Air.	4. *Washer* Recirculation Without Occupants.	5. *Washer* Recirculation With Occupants.	6. *Washer* Recirculation Without Occupants
	(Results Expressed in Parts per Million.)					
Date of test	Mar. 4	Mar. 4	Mar. 17	Mar. 17	Mar. 17	Mar. 18
Period of test	......	6 hrs.	......	4 hrs.	4 hrs.*	4 hrs.
Time of sampling	1 P.M.	3.30 P.M.	9 A.M.	1 P.M.	6 P.M.	1 P.M.
Temperature	......	38° F	......	54° F.	50° F.	55° F.
Turbidity	0	10	1	5	5	5
Color	13	42	15	26	21	24
Odor	1v	1v	2v	3a	3a	3a
Total solids	30.0	66.0	36.0	49.0	46.0	51.0
Loss on Ignition	10.0	32.0	17.0	20.0	17.0	18.0
Fixed solids	20.0	44.0	19.0	29.0	29.0	33.0
Total organic nitrogen	.100	.300	.100	.136	.108	.144
Albuminoid nitrogen	.048	.140	.068	.108	.092	.114
Free ammonia	.018	.218	.006	.404	.362	.508
Nitrites	.000	.016	.001	.007	.005	.007
Nitrates	.05	.06	trace	.06	.06	.06
Oxygen consumed	2.7	4.3	2.6	3.5	3.3	4.0
Chlorine	1.7	1.9	1.3	1.5	1.7	2.55
Hardness	11.0	19.5	10.0	19.5	17.5	20.0
Alkalinity	6.5	12.0	6.5	11.5	10.0	13.5
Incrustants	4.5	7.5	3.5	8.0	7.5	6.5
Iron	0.2	2.5	0.4	0.8	0.7	0.8
Total Bacteria						
Gelatine 4 days at 20°	80	90,000	380	12,000	20,000	2,900
Litmus Agar 2 days at 38°	7	9	3	10	75	55
Moulds on Gelatine	0	200	6	800	300	200
Amorphous Matter	0	1,000	184	638	574	238

*The number of men hours for this period was 180.

cooling plant to keep down the temperature of the indoor air,—or with the windows open it may be shut down to save expense.

The common standard of 30 cubic feet of air per capita per minute, which is now generally applied to school houses, was based upon the idea of keeping the carbonic acid down to a fixed amount. When it became recognized a few years ago that carbonic acid was a negligible factor,

TABLE IX.

QUANTITATIVE DETERMINATIONS OF BACTERIA IN AIR.

Sample.	1. Date. 1913.	2. Bacteria per Cu. Ft. Gelatine at 20°. Number.	3. Bacteria per Cu. Ft. Gelatine at 20°. Per cent. Removal.	4. Bacteria per Cu. Ft. Litmus Agar at 38°. Number.	5. Bacteria per Cu. Ft. Litmus Agar at 38°. Per cent. Removal.	6. Moulds per Cu. Ft. (Gelatine).
Using Outside Air:						
Outisde air 1.30 P.M.	Mch. 4	27		7		0
Washed air 2.00 P.M.	"	7	74%	3	57%	0
Exhaust air 1.10 P.M.	"	27		17		3
Exhaust air 3.45 P.M.	"	37		23		16
Outside air 2.10 P.M.	Mch. 11	17		3		0
Washed air 2.40 P.M.	"	12	29%	0	100%	0
Exhaust air 1.30 P.M.	"	57		13		23
Exhaust air 4.00 P.M.	"	130		30		30
(Without Washing.)						
Outside air 4.00 P.M.	Mch. 18	23		6		23
Exhaust air 4.30 P.M.	"	300		153		40
Recirculation, with occupants:						
Exhaust air 2.30 P.M.	Feb. 13	193		3		20
Washed air 2.30 P.M.	"	44	77%	0	100%	17
Exhaust air 4.15 P.M.	"	100		0		13
Washed air 4.15 P.M.	"	10	90%	0	.....	10
Exhaust air 2.15 P.M.	Mch. 17	483*		56		83
Exhaust air 5.15 P.M.	"	93		26		23
Washed air 5.30 P.M.		66	29%	17	35%	17
Recirculation, without occupants:						
Exhaust air 10.55 A.M.	Mch. 17	170		3		56
Exhaust air 1.05 P.M.	"	83		7		53
Washed air 1.25 P.M.	"	63	24%	7	0%	20
Exhaust air 12.00 P.M.	Mch. 18	86		17		46
Washed air 12.35 P.M.	"	60	30%	3	82%	17

*Possibly influenced by taking sample too soon after starting fans.

some made the inference that a smaller volume of air would suffice. They failed to consider that circulation of the air is of itself one of the essential elements of indoor comfort and a necessary feature of good ventilation.

The cost of heating large volumes of cold air has naturally stood in the way of efficient ventilation of schools and factories during the cold weather. Another difficulty has been the low indoor relative humidity produced by heating outdoor winter air to a comfortable room temperature. If, therefore, both of these objections can be overcome by washing air

TABLE X.

QUANTITATIVE DETERMINATION OF DUST.

Sample.	Date, 1913.	Number Dust Particles Per Cu. Ft.	Per cent. Removal.	Remarks.
Using Outside Air:				Mild. Thawing. Light breeze.
Outisde air 1.30 P.M.	Mch. 4	103,000		
Washed air 2.00 P.M.	"	98,300	5%	
Exhaust air 1.10 P.M.	"	56,300		
Exhaust air 3.45 P.M.	"	115,000		
Outside air 2.10 P.M.	Mch. 11	17,200		Cloudy. Light breeze. Heavy rainfall previous night.
Washed air 2.40 P.M.	"	13,000	24.5%	
Exhaust air 1.30 P.M.	"	63,000		
Exhaust air 4.00 P.M.	"	87,700		
(Without Washing.)				
Outside air 4.10 P.M.	Mch. 18	124,000		Slightly above freezing. Brisk S. W. winds. Washer idle.
Exhaust air 4.45 P.M.	"	200,000		
Recirculation, with occupants:				
Exhaust air 2.30 P.M.	Feb. 13	415,000		Temperature below freezing. Light to brisk wind.
Washed air 2.30 P.M.	"	149,000	64%	
Exhaust air 4.15 P.M.	"	266,000		
Washed air 4.15 P.M.	"	122,000	54%	
Exhaust air 5.10 P.M.	Mch. 17	171,000		Temperature about freezing. Light to brisk W. wind. Fair.
Washed air 5.40 P.M.	"	91,300	47%	
Recirculation, without occupants:				
Exhaust air 10.45 A.M.	Mch. 17	131,000		Temperature about freezing. Light to brisk W. wind. Fair.
Exhaust air 1.10 P.M.	"	97,000		
Washed air 1.20 P.M.	"	59,700	39%	
Exhaust air 12.10 P.M.	Mch. 18	90,000		Slightly above freezing. Fresh to brisk S. W. wind.
Washed air 12.25 P.M.	"	57,000	37%	

and using it over and over, so as to furnish an ample supply of clean air in motion the method is one that has much to commend it. Naturally there would be a limit to the continued use of the same air, but ordinary leakage and the possible use of a small percentage of outside air would prevent the concentration of any substances not removed by the washer.

Our study of the subject of air washing has led us to believe that it is one of the vital elements of ventilation in localities where it is difficult to obtain a supply of clean air, and that the recirculation of air thus washed is deserving of serious consideration from the standpoint of economy. It is very evident that the air washers now in operation are not giving as high a degree of efficiency as might be obtained with better designs and more skillful operation and the details of the process should be submitted to careful scientific research.

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THE SOCIAL HYGIENE MOVEMENT.

There was recently held in Buffalo, the Fourth International Congress on School Hygiene, concerning which a prominent life insurance expert made the comment—"They called it a congress on school hygiene, but it was in reality a conference on sex education; there wasn't a section of the congress that at some point in its program did not jump the track to discuss certain phases of the sex problem." This was literally true. One of the largest audiences of the entire congress, numbering several thousand persons, assembled to hear President Eliot and the other speakers on the program of the annual meeting of the American Federation for Sex Hygiene.

That the public is now thoroughly interested in the sex problem in all its various phases is certain. The many lectures and social hygiene meetings being held in every section of the United States are evidences of this; the columns of newspaper space devoted to the white slave traffic indicate it; the good, indifferent and vicious plays upon the subject that are bidding for public attention, prove that this interest extends to all classes;

the increasing volume of literature, also good, indifferent, and vicious, shows that the people generally are taking time to read; the fight for legislation relating to marriage, prostitution, minimum wage, protection of girls, is proof that the best elements of society recognize the importance of the problem, and are combining to work out a solution. It behooves the various organizations and individuals interested in the progress of this movement to study it intensively and to plan for the crystalization of public sentiment in sound laws and wise administration.

During the sessions of the International Congress referred to, there occurred another meeting which promises to have a far reaching influence on the situation. This was a joint conference between representatives of the American Federation for Sex Hygiene and the American Vigilance Association. As a result, formal action was taken ratifying a merger and reorganization of the work of these two associations under a single board of directors. A new name is to be chosen later, but the purpose of the union is to build up the strong, practical and representative organization for promoting investigation and progress along all lines of work related to the proper understanding and utilization of sex as an influence in the development of the human race, and for combating venereal disease, commercialized vice and other harmful influences which have developed about the sex functions. There seems to be money enough available to insure the carrying out of any plans adopted. The announcement of the directorate and executives which may be chosen will be awaited with the greatest interest and it is devoutly to be hoped that the personnel will be such as to give assurance of sane guidance in this new agency for human conservation.

The leaders of the new federation have a most difficult task before them. It will be necessary to weld together a large number of diversified and, even, antagonistic elements.

For example, there are those who believe that the teaching of sex hygiene is the only method of practical value; but within the ranks of this group, a difference of opinion exists as to what shall be taught, at what ages the teaching shall be undertaken, and by whom it shall be done.

There are others who believe that moral education of young people constitutes the only safe method of attacking this problem; of these some advocate the influence of the church in developing religious experience, and would suppress all information concerning sex; some would teach the simple facts of sex, and advocate a single standard of morals, encourage early marriage and the promotion of temperance, as the important things to do.

Still others believe the transmission of venereal diseases to be the only important phase of the problem, and advocate strict administrative control of these diseases as the key to the situation. But even the supporters of this view are sharply divided as to the proper methods to be adopted—Shall we segregate or not segregate the prostitutes? Shall we subject all prostitutes so far as possible to medical examination? Shall we provide isolation wards for venereal cases? Shall we establish venereal disease clinics, as tuberculosis clinics have been established? Shall we approve the prophylactic methods adopted by armies and navies?

Some are interested in this movement as a factor in the great vague field of eugenics.

There are also many equally sincere persons who regard all these efforts as futile. They hold that sex education only arouses in young men and women a morbid curiosity which had better be left dormant, or they say that prostitution has always existed and always will exist, and that the parents of each child can alone deal properly with the matter. To bring together these earnest persons holding divergent views, and sometimes fanatical in their convictions, in support of a scientific, and effective campaign is the most difficult task any public welfare organization has yet set itself.

The spirit of sarcasm evidenced in the article in the July number of this Journal and the bitterness of the reply published in September have been exhibited in a lesser degree many times during the recent history of the social hygiene movement, but there are signs that the future promises better things. One of the sanest, most encouraging pieces of actual constructive work that has been done in sex education is outlined in the second annual report of the Oregon Social Hygiene Society. The establishment of the Bureau of Social Hygiene for scientific laboratory, clinical and field research upon the underlying causes of prostitution and commercialized vice, marks another advance. The inauguration in New York City of a chain of diagnostic stations by the health department, and the making of syphilis and gonococcus infections reportable, is a most important event in the progress of the medical attack. The decision of this same city to add a "venereal" building to its infectious disease hospital group is a still further advance in the right direction.

When we consider a simple list of the serious and carefully planned efforts which are now being made by the various agencies to grapple with the large questions covered by the term social hygiene, it is manifest that the battle is on. The need of the hour is for a strong national organization equipped and manned to direct the fight. The work of the pioneer societies has prepared the way. Their foundation should now be built upon rapidly. There is need for standardizing the pamphlets and other literature which are being distributed. The material for popular lectures should be most carefully reviewed and censored. Exhibits and, particularly, statistics on this subject require to be worked over so thoroughly that their accuracy and import can not be challenged. It is to be hoped that the association may become an authoritative but conservative bureau of information upon every subject related to the problems of sex.

At the present moment there are two important issues connected with the social hygiene movement, upon which the general American public is seeking advice and guidance. (1) Shall we teach sex hygiene in the public schools? (2) Shall we actively try to suppress prostitution?

There are strong arguments against school instruction as it ordinarily would be given, but they are opposed on the ground that there is practically no such thing as ignorance of sex even among children. The question of sex-education of children is not one of innocence vs. sex knowledge, but of pick-up street tradition vs. the truth about sex. A number of careful educational experiments on this question are now being conducted in various parts of the world, and there seems to be reason for believing that it will be answered in due time. Meanwhile there is no discouragement in the fact that progress is slow in this direction, provided only it be progress. It is vitally important that education on this subject be sound, scientific, and wise. The new association should follow these experiments closely and make its observations available to the interested public.

Similarly it should watch the experiments in the suppression of prostitution and the control of venereal diseases. In theory this is a simpler problem than the selection of what shall be taught about sex, but in practice it is found to possess so many moral, medical, and other angles that the situation seems hopeless to all except the most courageous and persistent workers. Vice Commissions have repeatedly reported the failure of segregation as an effective measure for reducing either the prevalence of prostitution or of diseases associated with it, yet there continues in every city a large body of people who believe that an "unofficial" segregation is the necessary price of freedom from most undesirable scattering of prostitutes throughout residence districts. The experience of other cities is drawn upon for alleged facts and figures to support this position. The new association should be in possession of accurate and complete data about each city or community wherein any activity along these lines has been shown.

In short, the first function of the new society would seem to be the securing of trust-worthy information upon which a constructive program can be based. With the facts in hand a simple and effective educational campaign can be inaugurated, to be followed by the furthering of well considered legislation and the establishment of sound administrative methods. If, in pursuit of such experimental work as may be necessary to provide the desired facts, the hysteria and lack of balance which has too often characterized earlier interest in this problem can be suppressed, the new society will not only have justified its existence but will have earned the gratitude of all those to whom the public welfare is of deep concern. May it prove equal to its task!

SCHOOL VENTILATION IN NEW YORK CITY.

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and
Curator of Public Health, American Museum of Natural History, New York.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

Scope and Plan of Work.

As a part of a comprehensive investigation of the educational system of New York City, conducted by a committee of the Board of Estimate and Apportionment, Prof. Charles Baskerville and the writer were asked to make a study of the existing atmospheric conditions in the schools. Our task was to find out, first, whether the air to which the children were exposed during their school hours was satisfactory in quality, and, second, how far any differences observable between different schools were correlated with differences in ventilating plan or operation. The examination of all the six hundred schools in New York was obviously out of the question, but we selected thirty-two typical examples, ranging from modern and well-managed fan-ventilated schools to older buildings in congested tenement districts, ventilated without fans, and including buildings of various sizes from one of the largest high schools to a four-room country school in Richmond Borough. Ten of these schools were studied intensively, being visited once a week between December 2, 1912, and February 14, 1913, while the other twenty-two were visited on one or more occasions between February 14 and March 15, 1913. Each "visit" was made by a squad of three men who spent practically the whole school day in making determinations of temperature and humidity and carbon dioxid in the field and in collecting samples for the enumeration of dust particles and bacteria. Temperature and humidity observations were made with the standard United States Weather Bureau Sling Psychrometer and were supplemented by the use of Tycos thermographs, giving us continuous records for 364 different school days. Carbon dioxid determinations were made with the portable Petterson-Palmquist apparatus modified and improved for our purposes in certain minor details. Microbes in the air were enumerated by filtering a measured volume of air through a sand filter, washing the sand in sterile water and plating on litmus-lactose-agar, the general method recommended by the committee of the Laboratory Section of the American Public Health Association on Standard Methods for the Examination of Air. Dust particles were determined by passing the air through a sugar filter, dissolving the sugar in a measured amount of water and counting the particles in an aliquot portion under the ⅔-inch objective, another of the procedures recommended by the committee on Standard Methods. Altogether we made 1,854 observations of temperature and 1,845 of relative humidity with 773 determinations of carbon dioxid, 684 of microbes and 658 of dust particles.

In addition to these routine observations we made a special study of air supply and air circulation in certain selected schools by the use of the anemometer and joss sticks and by an elaborate series of local temperature observations at different points within the rooms; and we had conducted (by Dr. D. R. Lucas) a special investigation of the specific proteid material which Professor Rosenau believes it is possible to detect in air by the use of the anaphylactic reaction.

GENERAL ATMOSPHERIC CONDITIONS IN THE NEW YORK SCHOOLS.

The general results of our routine studies are indicated in Figure I and in Tables I–V below. They are expressed in the form of distribution curves, the abscissæ representing the observed values in each case and the ordinates the percentage of all observations falling within the limits of values indicated below.

Taking the upper graph first it should be noted that although the curve is labelled "Bacteria" it really includes yeasts and molds as well, all microbes in fact, which will form visible colonies on litmus-lactose-agar in five days at room temperature. The most frequent result is twenty-five microbes or less per cubic foot, but the high results pull the general average up to ninety-six. As indicated in Table I, however, 68 per cent. of the samples showed counts of 100 or less and only 9 per cent. counts over 200.

TABLE I.

DISTRIBUTION OF COUNTS OF MICROBES IN AIR OF NEW YORK SCHOOLS.

Microbes Per Cubic Foot.	Under 50.	51–100.	101–150.	151–200.	201–250.	251–300.	Over 300.
Per cent. of samples in each class...........	41	27	17	6	4	2	3

These counts include all sorts of organisms, from all sorts of sources, which are able to withstand drying long enough to be lifted up and blown about in the air. Most of them, of course, are of no sanitary significance; and the values, averaging under 100 per cubic foot and in most samples, much less, must be considered satisfactory by comparison with the results reported by Miquel (150 bacteria per cubic foot in the air of Paris), by

Tenon (40–60 bacteria per cubic foot in quiet hospital air), by Hesse (60 bacteria per cubic foot in a class room before the students arrived, raised to 430 during the hour and 1,000 just after the class had left), and by Soper (140 bacteria per cubic foot at remote end of Fulton Street subway station). In order to obtain an estimate of the bacteria of human origin, which might at times include pathogenic forms, we made all our plates on litmus-lactose-agar as noted above and isolated all red colonies which appeared on the plates. It is well established that acid-forming streptococci are among the most abundant forms in the human mouth while they are absent from sources which have not recently been exposed to human or animal pollution. The numbers of these organisms in school-room air were found by Professor Baskerville and myself in preliminary experiments a year ago to be quite small. We then found among 30,000 colonies isolated from 750 plates, exposed in schools with window ventilation, only ten mouth streptococci.

In the present study, in the examination of a total of 868 cubic feet of air, we found fifty-two mouth streptococci, or six for every 100 cubic feet of air. The average number of mouth streptococci for the individual schools ranged for the most part between two and seven per 100 cubic feet. In one crowded school in a poor district, it rose to fifteen per 100 cubic feet, and in a school in a good semi-suburban district, no streptococci were found in 41 cubic feet of air. The general average of six mouth streptococci per 100 cubic feet gives a ratio of about one of these forms to 1,600 total bacteria.

The trend of epidemiological evidence is strongly against the spread of disease germs by quiet air, as is best illustrated by the practice of some of the most modern hospitals in which various contagious diseases are successfully treated in open wards, with no precaution against air infection, provided only that the spread of disease by direct contact is rigidly excluded. Our bacteriological results seem in harmony with these deductions from practical experience. A child breathes less than 100 cubic feet of air during an average school period and these mouth streptococci must, of course, be far more abundant than pathogenic forms. At a rate of four or five mouth streptococci per day the chance of ingesting pathogenic bacteria from the air is seen to be a very slender one.

The general distribution of dust counts is shown in Table II and in the second graph of Figure I. It will be seen that the largest number of samples showed between 200,000 and 400,000 particles per cubic foot. The general average for all schools was 601,000 particles and 20 per cent. of the samples showed 800,000 or more with a few values ranging up to 2,000,000 and over.

The sanitary significance of these results is probably not great. Dust particles constitute a serious menace to health in industrial establishments,

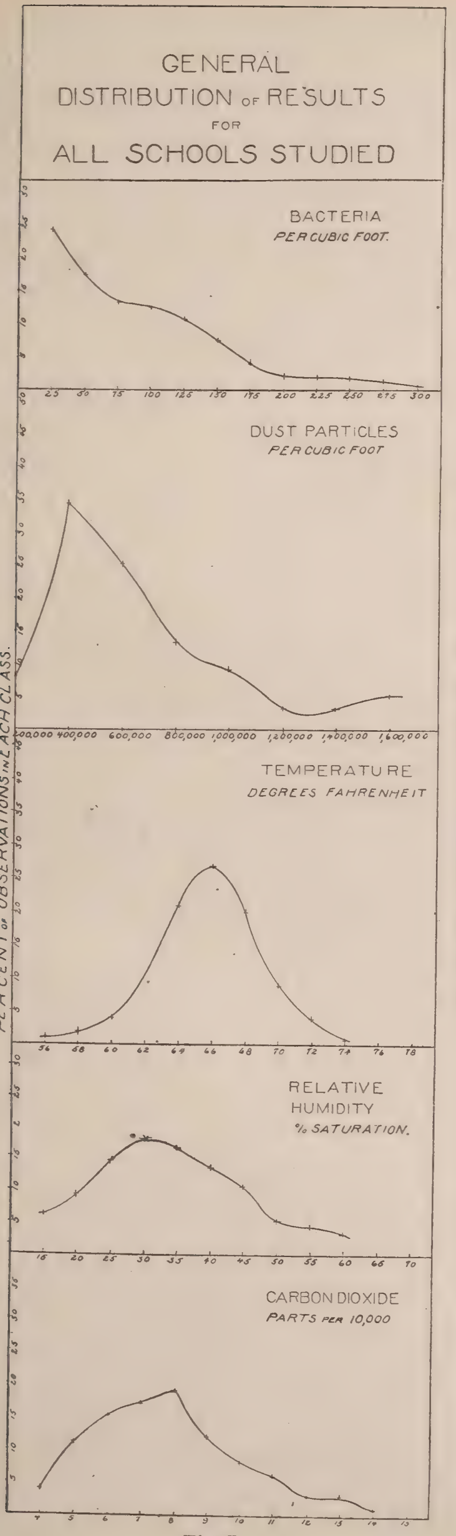

Fig. I.

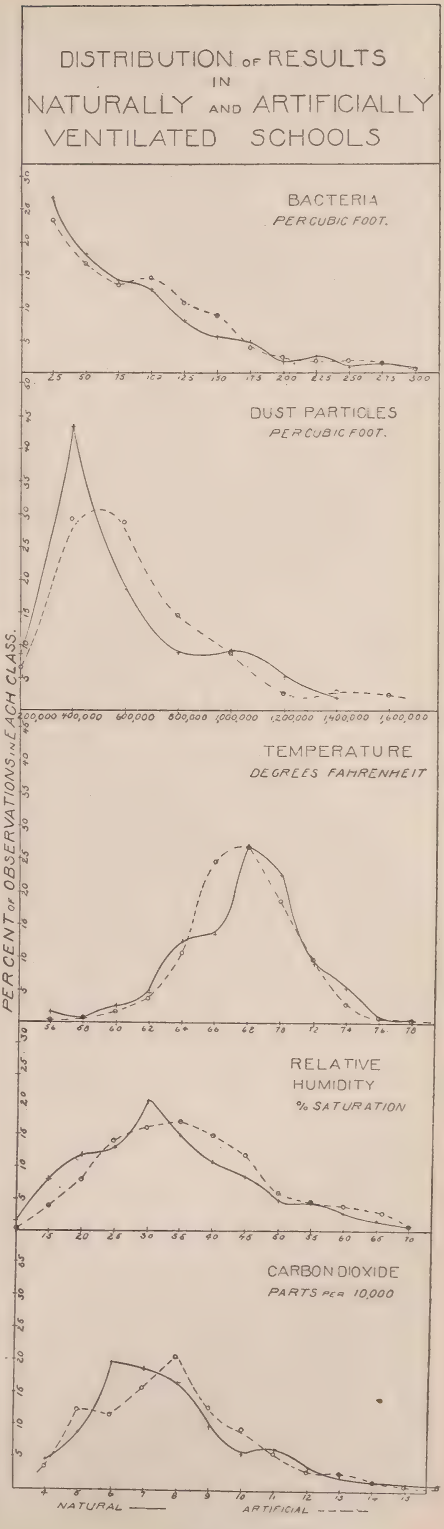

Fig. II.

Fig. I.—General distribution of observations as to the quality of New York schoolroom air.
Fig. II.—Comparison of air conditions in naturally and artificially ventilated schools.

TABLE II.

DISTRIBUTION OF DUST DETERMINATIONS IN AIR IN NEW YORK SCHOOLS.

Dust Particles Per Cubic Foot.	Under 200,000.	200,000 to 400,000.	400,000 to 600,000.	600,000 to 800,000.	800,000 to 1,000,000.	1,200,000 to 1,400,000.	Over 1,400,000.
Per cent. of samples in each class	8	34	25	13	9	3	5

grinding shops, granite cutting sheds and the like, since the hard metallic or mineral particles which are found under such conditions injure the lung tissue and often form a controlling cause in the development of industrial tuberculosis. There is no evidence, however, to show that such particles as occur in ordinary school-room air have any such significance. The particles which we found were for the most part minute and chiefly organic in nature. In the counting cell they separated into two layers, the greater number, floating on the surface, being barely visible under the microscope and consisting in large part of mold spores while less numerous particles settling on the bottom included larger shreds of vegetable fiber and inorganic matter. There is no reason to suppose that particles of such small size and of such nature as were found exert any influence on health.

The general results of the temperature observations made by our field squads with the sling psychrometer are indicated in Table III and plotted in the central curve of Figure I.

TABLE III.

DISTRIBUTION OF TEMPERATURE RECORDS IN NEW YORK SCHOOLS.

Temperature, Degrees F.	Under 60.	60 to 61.	62 to 63.	64 to 65.	66 to 67.	68 to 69.	70 to 71.	72 to 73.	74 to 75.	Over 75.
Per cent. of observations in each class	1	2	4	11	21	27	20	9	4	1

It is evident that these records as a whole indicate very good conditions. The temperature curve centers closely, as it should, about 68°. The table shows only 14 per cent. of all records over 71° and only 5 per cent. over 73°. Sixty-eight per cent. of all records fall between 66° and 71°, a reasonable and equable temperature. On the whole this result must be considered highly creditable and an indication that the children of the

New York schools for the most part enjoy good atmospheric conditions, free from objectionable overheating. An examination of particular schools, however, shows that this general curve covers up markedly different conditions in individual cases; and these will be discussed later, in connection with the question of ventilating systems and their operation.

The general distribution of results in regard to relative humidity are shown in Table IV and in the fourth curve of Figure I.

The range of relative humidity is seen to be a wide one. Sixty per cent. of all observations, however, fall between 20 per cent. and 40 per cent. of saturation and the general average for all schools is 35 per cent. indicating a distinct dry atmosphere.

TABLE IV.

DISTRIBUTION OF RELATIVE HUMIDITY RECORDS IN NEW YORK SCHOOLS.

Relative Humidity, per cent. Saturation.	Under 16.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 to 60.	Over 60
Per cent. observations in each class.	6	9	14	17	16	13	10	5	4	3	3

The chief controlling factors in the humidity of the school room are of course, the moisture of the outside air and the extent to which the temperature of the air is raised on entering the building. We found a close correlation between outdoor temperature and indoor relative humidity, closer if anything in the naturally ventilated than in the artificially ventilated schools. This is an important point in view of the criticism often leveled at the supposedly abnormal air of fan-ventilated schools. It does not make the least difference whether air is heated in the ducts or in the rooms, the same rise in temperature producing the same drying effect.

The only way to avoid dry air in the school room with certainty is by means of fan ventilation combined with artificial humidification. We studied two examples of this in School 6, Brooklyn (where the air is washed in an air-washer of the spray type) and in School 27 (where half the building has air humidified by a steam jet). Neither school has automatic humidity control. The air in these schools was more moist than the average though not very markedly so. In School 6, 75 per cent. of all observations were under 50 per cent. saturation and 21 per cent. under 35 per cent. saturation, the corresponding proportion of observations falling in these classes being 83 per cent. and 58 per cent. for the humidified half of school 27 and 90 per cent. and 62 per cent. for the average of all schools.

How far we are justified as sanitarians in demanding effective artificial humidification of school-room air seems to me very uncertain. There is a strong and probably correct impression that very dry air in the school room is objectionable but this impression rests on no sound basis of demonstrated facts and there are, so far as I am aware, no physiological experiments which enable us definitely to say that a humidity of 50 per cent. or 25 per cent. of saturation is harmful to health.

Our results in regard to carbon dioxid are summarized in Table V and in the lowest graph of Figure I.

TABLE V.

DISTRIBUTION OF CARBON DIOXID DETERMINATIONS IN AIR OF NEW YORK SCHOOLS.

Carbon Dioxid, Parts per 10,000.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	17.
Per cent. of observations in each class..........	4	11	15	17	19	12	8	6	3	3	1		2

The general average value for all schools was 8.1 parts per 10,000. Sixty-six per cent. of the observations fell below 8.5 parts which may be considered a very satisfactory result on any standard. Twenty-nine per cent. of the tests showed between 8.5 and 12.5 parts, which would have been considered high on the older standards established when carbon dioxid was held to be a measure of some mysterious poisonous matter in the air. The present tendency among physiologists and sanitarians is to allow a more liberal standard, however, Dr. J. S. Haldane, Dr. Leonard Hill and Dr. M. S. Pembrey in testifying before the English Departmental Committee on Humidity and Ventilation in cotton-weaving sheds favored a standard of 12 parts per 10,000 for factories and I see no reason why a more rigid standard should be enforced in school rooms. There remain 6 per cent. of the tests, however, showing over 12.5 parts, which are clearly excessive. These were associated with overcrowding and deficient air supply in individual rooms. Supplementary observations made in four schools during evening sessions (when there is no artificial ventilation) showed some very high carbon dioxid values ranging in one case with gas burning up to 26.0 parts. This is a special problem which deserves more attention than it receives in many cities.

Studies of Air Supply and Air Circulation.

Our analytical data were supplemented by a study of the distribution of air to individual rooms and its circulation within the rooms themselves which are of some interest as showing how the mechanics of ventilation work out in practice.

Inlet and outlet velocities were studied with the anemometer in fifty rooms, twenty-five in one of the best fan-ventilated schools (33 Bronx), sixteen in four fan-ventilated schools where high carbon dioxid values had been found, and nine in four schools ventilated without fans. The amount of air supply in the fan-ventilated schools is indicated in Table VI which shows that in School 33 the amount was more than ample while in the poorer school it was inadequate.

TABLE VI.

AIR SUPPLY IN WELL-VENTILATED AND POORLY VENTILATED ROOMS.

Cubic Feet of Air per Pupil per Minute.	Number of Rooms in Each Class.					
	Under 10.	10 to 30.	30 to 50.	50 to 70.	70 to 90.	90 to 110
Well ventilated rooms (School 33)	....	2	8	9	4	2
Poorly ventilated rooms	2	12	1	1	....	....

In School 33 the effective area of the inlets averaged 5.1 square feet and of the outlets 5.6 square feet and the linear velocity at inlets and outlets, respectively, averaged 373 feet and 141 feet. In the sixteen poorly ventilated rooms the average inlet area was 4.4 square feet, the average outlet area 4.0 square feet, the average inlet velocity 189 linear feet and the average outlet velocity 83 linear feet. The average number of pupils per room was thirty-five for School 33 and forty-five for the sixteen poorly ventilated rooms. For the most part we found a good plenum condition in all the fan-ventilated rooms as shown in Table VII. The very high ratios were usually in rooms with doors or windows open.

TABLE VII.

RATIO OF AIR ENTERING AT INLET TO AIR LEAVING AT OUTLET.

Ratio.	Forty-one Fan-Ventilated Rooms.					
	Under 1	1 to 2.	2 to 3.	3 to 4.	4 to 5.	Over 5.
Number of rooms...............	2	11	10	6	4	8

The results obtained in the naturally ventilated rooms are not very significant since doors and windows were freely opened. It is of interest to note, however, that in one school we found inlet velocities of 200 and 300 linear feet per minute without fans, maintained by enormously high temperatures of inlet air.

The circulation of air within the rooms themselves was studied by the use of smoking joss sticks and by an elaborate series of local temperature measurements. The results obtained by the use of the joss sticks in about seventy rooms were very hard to generalize. In about half of the fan-ventilated rooms there were clean cut currents which could be traced across the upper part of the room, down the side wall opposite and back along the floor to the outlet. In an equal number of cases, however, the currents were indefinite and broken and in a few cases no currents at all could be discerned. In the rooms without fans the currents were usually very erratic, although in one or two cases a definite circulation was produced by windows open at top and bottom. In general the naturally ventilated rooms were much more subject to local drafts than were those ventilated by fans.

The local temperature observations were on the whole more valuable as throwing light on air circulation. In twenty-four rooms in fan-ventilated schools we found an average increase in temperature between inlet an outlet of 4.3° which illustrates the importance of keeping incoming air under 66° if the room temperature is not to rise above 70°. The outlet temperature corresponds very closely to the general room average. The average difference between these two readings for thirty observations (ignoring the direction in which the deviation occurred) was just 1° and only two observations showed differences of over 2°. This indicates that the outgoing air is a pretty fair sample of that in the room and that its temperature may be taken as a fair measure of that of the room as a whole. The difference between bottom (three feet above floor) temperature and top (twelve feet above floor) temperature was inconsiderable, and more variable than might have been expected. Of twenty-six rooms in which both were determined, just half showed a higher temperature at the top than at the bottom, while in the rest, the upper air was cooler. The top excesses were higher than the bottom excesses, however, averaging over 2.0° instead of under 1.0°. The slight extent of the differences observed is probably due to the fact that on the one hand cool air was being blown in at the top of the room while on the other hand the air as it was warmed in the room tended naturally to rise. This condition must interfere to some extent with normal air circulation and offers a certain argument in favor of upward as opposed to the usual downward ventilation. Finally, the range between the maximum and minimum individual temperatures observed in the rooms is significant as a measure of general air circulation. The differences ranged for individual rooms between 3.0° and 15.1°, and averaged 6.2°, showing on the whole a fairly good mixture of the air. These observations were all made in fan-ventilated rooms. In rooms ventilated without fans conditions were more variable. A marked difference appeared as might be expected, in the relation between top and bottom temperatures. Of the fan-ventilated rooms just as many were cooler near the ceiling as were warmer there, although the average temperature for all the rooms was about 1.0° higher at the top. Among eighteen rooms without fan ventilation (that is without a current of cool air blown in near the top) all but one showed a higher ceiling temperature, the excess in two cases being over 11.0 and averaging 5.5°. Another marked difference between the fan-ventilated and the artificially ventilated rooms lies in the evenness of temperatures at different points. The range of difference between maximum and minimum room temperatures, for the fan-ventilated rooms as noted above, was from 3.0° to 15.1°, and the average 6.2°. For thirty-nine naturally ventilated rooms, it ranged from 1.2° to 20.0° and averaged 7.7°. Obviously the air circulation is rather defective when such conditions exist.

It may be of interest to note that in five of the naturally ventilated rooms, all in one building, the temperature of the incoming air was respectively, 83°, 86°, 90°, 98° and 125°. In the latter case one of our thermometers (registering to 130°) was burst by the heat of the inlet air the first time the temperature was taken.

COMPARISON BETWEEN NATURALLY AND ARTIFICIALLY VENTILATED SCHOOLS.

For the purpose of estimating the value of fan ventilation, as actually operated in New York, curves were plotted for all the schools classified on this basis and this curve is reproduced in Figure II, page 1161. Of course it must be understood that by natural ventilation it is meant simply that fans are not running. In almost all cases, ducts and often heating coils were there and air was undoubtedly passing through them. So, on the other hand, where fans were in operation, windows were often open and outside air passing in or out through them. The distinction is made solely on the fact that fans were or were not in operation in connection with the particular room in which each test was made.

The general results for the two classes of schools are on the whole remarkably alike. The fan-ventilated schools show more dust, more humidity, more carbon dioxid and a somewhat more equable temperature; but none of the differences are very great or very significant.

The high humidity and high carbon dioxid in the fan-ventilated schools can best be accounted for on the assumption that in the window-ventilated schools on the whole, there is actually more air supplied than is blown in by the fans in the other group. The higher dust counts may perhaps be due to the same thing, less air to dilute dust produced within the school, or to the fact that air entering at a high velocity through a duct brings in more dust from outside than does air coming in more slowly through window openings. In dust and carbon dioxid, the fan-ventilated schools appear slightly inferior to the others. In humidity they are better (if dry air be a disadvantage). In temperature they are also somewhat better, showing less observations over 72°.

So far as temperature is concerned, however, it should be noted that the curve for the fan-ventilated class conceals wide variations between the individual schools included in it. Of our ten regular schools it is noteworthy that the four really good records (from the standpoint of temperature) were in fan-ventilated schools. The three wholly or partly naturally ventilated schools are mediocre or poor; and two fan-ventilated schools are worst of all. In Figure III are shown typical curves for these three classes. Either almost perfect conditions or very poor conditions may be obtained with fan ventilation according to the care and intelligence of the janitor in charge.

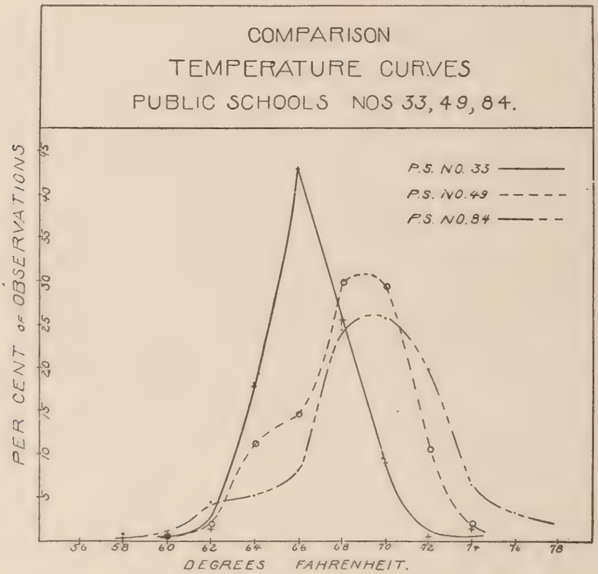

Fig. III.—Temperature curves for a good fan-ventilated school (33), a naturally ventilated school (49) and a badly-operated fan-ventilated school (84).

On the whole it can be said that comparing the actual condition of rooms ventilated with and without fans, New York was not last winter deriving any material advantage from its fan ventilation as actually operated.

THE PROBLEM OF OPERATION.

This brings us to the crux of the whole matter, as it was made evident in this investigation, the problem of careful operation.

We found certain schools of either the fan-ventilated or the naturally ventilated type which had an ample air supply and uniformly low carbon dioxid values. We found other schools, of both types, in which the supply of air was inadequate and carbon dioxid figures consequently high. In the case of fan-ventliated schools this usually meant low-inlet velocities (sometimes inadequate inlet areas), or overcrowding, while in the naturally ventilated schools it meant either overcrowding or neglect to open windows. It may be noted that the worst carbon dioxid record obtained in any school was in a four-room country school in Richmond Borough, heated by hot air (five records out of eleven over ten parts and three over twelve parts), and the next in a large plenum school on the East Side (twenty-three out of fifty-four records over ten parts and ten over twelve parts). In the latter case the special rooms studied showed an air supply of only 14.2 cubic feet per pupil per minute.

The most striking results of careless operation were shown, however, in the matter of overheating. In the case of the naturally ventilated schools the coöperation of both janitor and teachers is required in order to secure good results and where so many persons are concerned it is practically impossible to reach a maximum of efficiency. As pointed out above, the temperature curves for our naturally ventilated schools were all more or less mediocre. Such a result as that indicated in Figure III for School 33 could scarcely be attained where window ventilation plays any large part.

In fan-ventilated schools on the other hand the whole responsibility rests (or should rest) with the janitor and either very good or very bad results may be attained according to his intelligence and responsibility. The continuous records obtained by our recording thermographs brought out the importance of the operating factor with startling clearness and four of our curves are reproduced herewith to illustrate the variation which occurred.

Figure IV shows the admirable conditions maintained in School 33, to which reference has been made above. It will be noted that for the twenty days our clock was in the school the temperature was maintained with perfect regularity close to 65°, never once in the rooms where the clock was placed rising over 70°. Figure V shows a record almost equally good. Here the janitor allows the building to cool off rapidly after 3 o'clock an economical procedure if not carried to the point of chilling the pupils.

Figure VI shows a striking contrast to the last two figures, giving a clear picture of the exaggerated variations in temperature which occur in a carelessly operated school, provided with fans which are often not in operation. Out of 113 sling-psychrometer records in this school thirty-two or 28 per cent. were over 71° and thirteen or 11 per cent over 73°. The thermograph records are the worst obtained anywhere. On the most spectacular day, January 9, starting in at 63° at 8 o'clock, the temperature

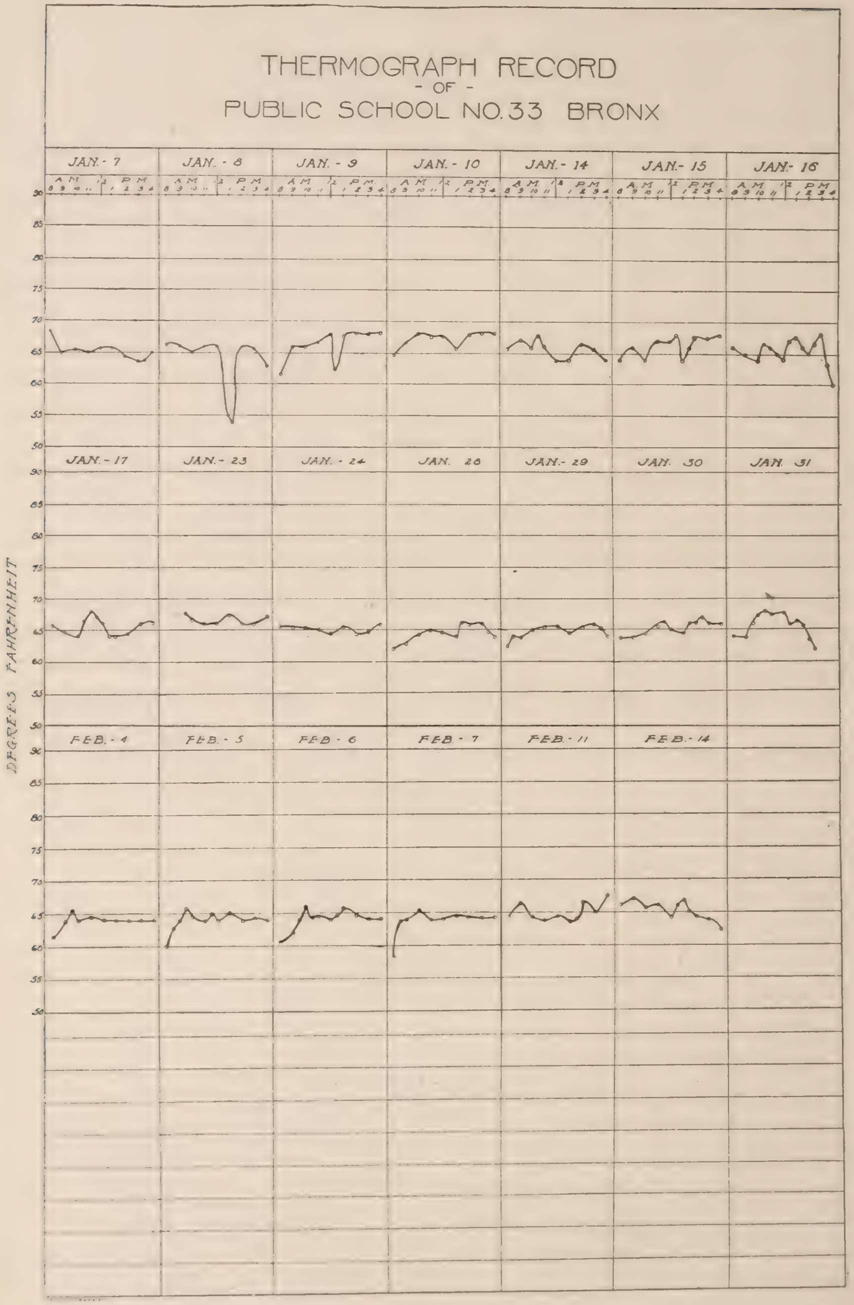

Fig. IV.—Automatic temperature records in a well-operated fan-ventilated school.

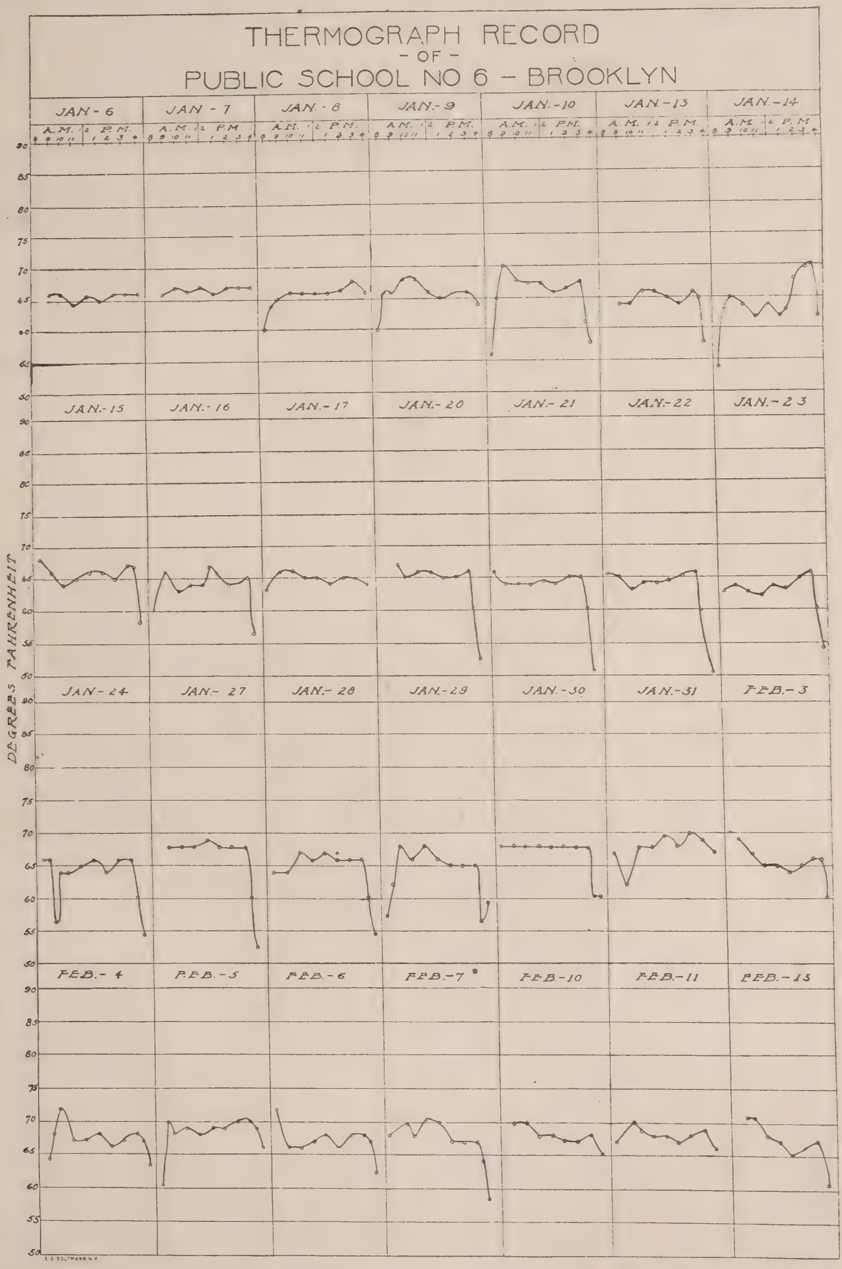

Fig. V.—Automatic temperature records in a well-operated fan-ventilated school.

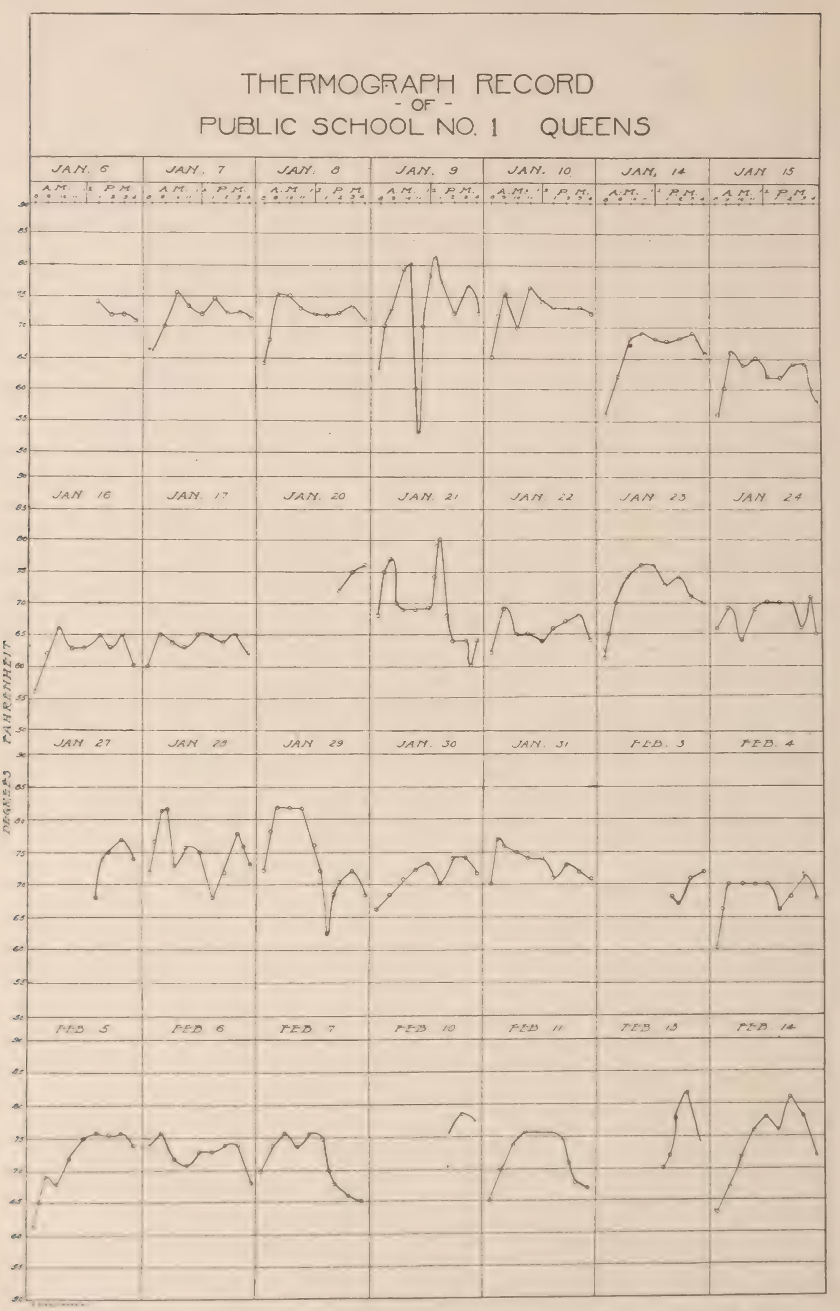

Fig. VI.—Automatic temperature records in a badly-operated fan-ventilated school.

was rushed up to 80° at 10.30. Then in a fit of remorse on the part of the janitor, or a spasm of self-defence on the part of the teacher in the particular room where the clock was placed, the temperature was reduced to 53° at 11.15. The relief was short lived, however, for the thermograph registered 81° at 12.30, and stayed over 72° for the rest of the day. On eighteen out of twenty-eight days for which we have records in this school the temperature reached 75° and on six of them it reached 80°.

Figure VII shows very bad conditions as to over heating in a naturally ventilated school. During the six days for which we have records the temperature was almost constantly between 75° and 80° and once reached 87°.

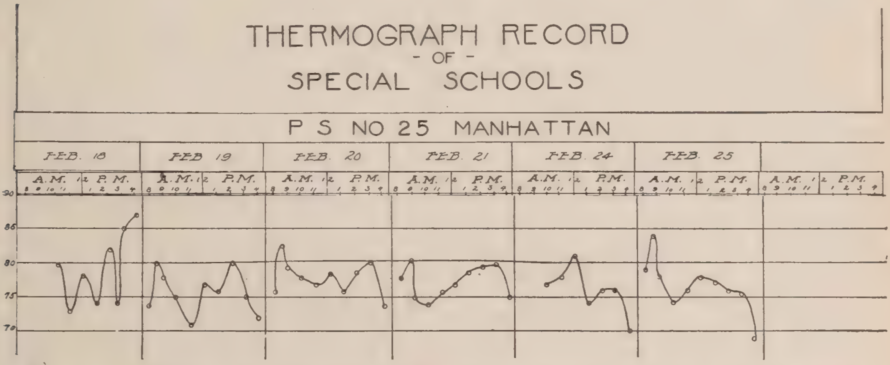

Fig. VII.—Automatic temperature records in a badly-operated naturally-ventilated school.

As a result of this portion of our studies, Professor Baskerville and I concluded that "In certain schools, as strikingly indicated by our thermograph charts, extravagant variations of temperatures with gross overheating are the rule rather than the exception, and the effect upon the health and efficiency of the children must be a serious one. So far as we can discover, these bad conditions are not due primarily to faults of construction in the ventilating systems but to careless operation on the part of the janitors in charge, or to interference with the janitors by teachers." In order to remedy this condition we urged that "a thermograph of some improved type be thus installed in each school building and that the records obtained be carefully inspected and made the basis for an efficient control of ventilating systems and janitorial service," and we recommended that these records be supplemented by periodical studies of temperature and volume of air at the room inlets.

CRITERIA FOR SCHOOL-ROOM AIR.

The chief value of these investigations lies, perhaps, in their possible use as a basis for comparative studies in the schools of other cities, which are greatly needed if scientific records are to take the place of opinion in the field of school ventilation.

The results obtained in regard to dust and bacteria seem to indicate that, so far as these suspended matters are concerned, the air of the New York schools is in a satisfactory condition, without any special measures of protection such as ozone disinfection or air washing. We have a reasonably good basis for the conclusion that a count in the neighborhood of 100 microbes per cubic foot is entirely normal for city air and the results here reported in regard to the proportion of mouth streptococci found do not lend any weight to the belief that such air can play any part in the transmission of microbic disease. For dust particles comparatively few determinations have been reported by methods at all comparable with ours. Here too, however, there seems no reason to conclude that a dust count of half a million to a million particles (visible under the $\frac{2}{3}$-inch objective) indicates anything more than a normal and innocuous condition. It seems to the writer in view of these results, that the tests for dust and bacteria in school-room air are of relatively minor practical importance except in cases of some special local pollution yielding results considerably in excess of those found in New York.

So far as carbon dioxid is concerned our results indicate that it is comparatively easy, either with or without the use of fans, to keep the air in a school room so changed that its carbon dioxid will average well under ten parts per 10,000 and will rarely exceed twelve parts. This test furnishes an excellent measure of air change and under ordinary conditions such an air change is essential in order to remove odors and preserve a freshness agreeable to the senses. Where air is recirculated, however, with washing or chemical treatment to remove odors, the carbon dioxid standard may have to be relaxed still further, although it will always be of value as an index of what is going on in the way of air dilution.

In view of the claim of Rosenau and Amoss that specific proteid compounds of human origin can be detected in respired air by the delicate physiological reaction of anaphylaxis we devoted considerable attention to this point. Dr. D. R. Lucas, who conducted this part of the investigation, was able easily to demonstrate the presence of such specific proteid substances in the saliva under carefully controlled conditions but was unable to detect them in material condensed from the breath or in air heavily contaminated by the respiration and exhalation of dogs and human beings. We were forced to conclude that "there is at present considerable uncertainty as to the presence of such specific proteid substances in demonstrable amounts in respired air and that there is absolutely no evidence of the presence of any organic substances of a deleterious nature in such air." Similar experiments carried out simultaneously by Dr. Charles Weisman at Columbia University and published as a Doctors' Dissertation have led to the even more definite conclusion that "the results of these experiments disprove the statements of Rosenau and Amoss that the breath contains 'volatile' protein and that such 'volatile' protein is an important respiratory factor."

There seems no good reason to doubt the general soundness of the conclusion arrived at by Flügge eight years ago that "Whenever in closed crowded rooms certain impairment of health ensues, such as headache, dizziness, nausea, etc., these symptoms are to be attributed solely to heat retention." This position may at any time be modified by experiments demonstrating the presence of chemical poisons in respired air but such experiments have not yet been made public and at present it seems clear that overheating is the chief evil to be guarded against in conditioning the air of school rooms.

The one vitally important thing that needs to be done at present in connection with school ventilation is to obtain records of actual school-room temperatures and to remedy the abuses that such records will certainly reveal. If in New York City, where a great deal of public attention has been focused on school ventilation during the last few years, we found over one seventh of our records of temperature over 71° it is probable that schools in many smaller cities and towns would show very much worse results.

Finally the problem of humidity is a most important one but its satisfactory answer must wait for further physiological investigation. The air of all school rooms kept at a temperature between 60° and 70° in winter must necessarily be dry, as we have found it in New York, unless artificial humidification be resorted to. How far such artificial humidification is required, however, cannot as it seems to me be definitely stated without a sound physiological basis which is still lacking.

A STUDY OF THE HYGIENIC CONDITION OF THE AIR IN CERTAIN TEXTILE MILLS WITH REFERENCE TO THE INFLUENCE OF ARTIFICIAL HUMIDIFICATION.

H. W. Clark and Stephen DeM. Gage.

Read before the Sanitary Engineering Section, American Public Health Association, Washington, D. C., 1912.

For many years the subject of occupational hygiene has attracted the attention of sanitarians. Since its creation in 1869, the Massachusetts State Board of Health has made many investigations of the working conditions in different industries, and as a result of these investigations laws have been framed and enacted to protect the health of persons employed in a number of industries. In 1906, the report of an extensive investigation of occupational hygiene in more than sixty different Massachusetts industries was published, in which the conditions in the various departments of the textile industry were treated in detail,* and attention was called to the apparently excessive heat and moisture which the manufacturers considered it necessary to maintain in the air of the rooms where certain processes were employed.

In 1910 a law entitled "An Act Relative to Regulating the Humidity and Temperature of the Atmosphere in Textile Factories" was passed by the Massachusetts legislature,† by which not only was the amount of moisture which might be present in the air restricted to certain specified limits, but it was also provided that only pure water might be used for the introduction of artificial humidity. The enforcement of this law was placed in the hands of the State Board of Health.‡

Although the relation of the humidity of the air to the health of textile employees has received comparatively little attention in this country, it has been under investigation by the English government for over twenty years, and the amount of moisture artificially introduced into weave sheds has been under government control in England since 1889, and rules regulating both temperature and humidity in cotton weave rooms have been in operation since 1898.§ The Massachusetts law followed the English regulations quite closely with reference to the permissible limits of humidity and temperature, but applies those limits to both the spinning and weaving departments of all textile factories, and also provides that only pure water shall be employed for producing artificial humidity in any part of the textile industry.

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*Thirty-eighth Annual Report, Mass. State Board of Health, pp. 455–487.

†Chapter 543, Acts of 1910.

‡After June 1, 1913, the enforcement of this and other factory laws becomes vested in a new State Board of Labor and Industries.

§Reports Departmental Committee on Humidity and Ventilation of Weaving Sheds, London, 1909, 1911.

The provisions of the Massachusetts Act with reference to the permissible limits of humidity were specific, but the choice of instruments to be used for humidity determinations was left entirely to the discretion of the State Board of Health, and while many of the mills were more or less completely equipped with such instruments, there was no uniformity in the type, nor was there any reliable data by which the relative accuarcy of these different instruments could be ascertained. Furthermore, what information was available as to the condition of the air in Massachusetts textile mills was entirely the result of inspection, and little practical information was at hand as to influence of various methods of artificial humidification upon the condition of the air, nor as to the effect of the character of the water which might be used for introducing humidity. During 1910 and 1911 studies were made to ascertain the relative accuracy of various types of instruments used for measuring humidity, and to determine the condition of the air in typical mills where artificial humidification was employed. The results of the comparison of various types of hygrometers, psychrometers, etc., will shortly be published elsewhere, and it is with the studies of the air in the mills which were made by the staff of the Lawrence Experiment Station that the present paper has to deal.

INFLUENCE OF THE CONDITION OF THE AIR UPON HEALTH AND COMFORT.

While the varying composition of the mixture of gases and impurities called air has been known for many years and the effect of many of the components and impurities upon the human organism has been determined, it is only within a comparatively few years that it has been fully realized how great an influence the condition of the air exerts upon the general health, comfort and energy of individuals and communities. Pure air is a mixture of about four parts nitrogen and one part oxygen. Pure air, however, is practically unknown and the air which surrounds us always contains certain amounts of water vapor, of other gases, and of finely divided particles of organic and mineral matter together with greater or less numbers of living organisms, all of which may effect in one way or another the health or comfort of the individual. The human body is so constituted that it readily adapts itself to considerable fluctuations in the proportion of oxygen and nitrogen of the air, and it has been amply proved that the amounts of carbon dioxide which are at all likely to be present in mill air are without any appreciable affect. Carbon monoxide, which is an active poison, may occasionally be present in the air of mills in which gas is used for fuel or lighting. Gas is still used for lighting in some of the older mills, and in some cases gas flames are used for singeing the cloth in the finishing process. The probability of carbon monoxide being present in measurable amounts in the air of the larger mills, however, is extremely slight. Other gases such as methane, hydrogen, etc., which because of their explosive properties when mixed with air are of extreme importance in the question of the air in mines, etc., and chemical fumes and vapors which may effect the health of employees in certain industries apparently have no place in the present problem.

The physical condition of the air, however, is a much more important factor, the circulation of the blood, the assimilation of food, and practically every other function of the body being directly or indirectly affected by the temperature and humidity. The body is constantly producing heat which must be expended in energy or in the evaporation of moisture or must be lost by radiation. The performance of the body functions and the health of the individual are completely dependent on the elimination of this body heat. The body will perform its functions for a time even when surrounded by air which is considerably above the body temperature if the humidity is not too great, the excess body heat being eliminated by the evaporation of the profuse perspiration which is usually induced under such conditions. On the other hand, if the temperature of the air be lower than that of the body the excess body heat will be lost by radiation even although the air be saturated with moisture. It the temperature of the air rise above that of the body, however, and the air is saturated with moisture, there is no way for the excess body heat to escape and fever follows with all its accompanying derangements of the body functions. Persons employed indoors, and especially those whose occupations are more or less sedentary are particularly susceptible to the physicial condition of the air. In a cool bracing atmosphere with relatively low humidity all the body functions are more active, breathing is deeper and more frequent, the circulation of the blood is increased, the digestion of food is stimulated, and more and a greater variety of food is consumed, with the result that the various ingredients necessary for the upbuilding of the body cells are not only more numerous but are better assimilated. In a hot moist atmosphere, however, the conditions are reversed, the blood is brought to the surface of the body, and the brain and organs of digestion and absorption are depleted, and not only are mental and physical activity reduced but the general resistance of the body to disease is lowered. The feeling of depression felt in badly ventilated rooms is largely caused, not by excess of carbonic acid or depletion of the air of its oxygen or by toxic substances emanating from the occupants, but from the fact that the temperature and humidity have increased and normal evaporation from the skin has been reduced, thereby affecting the temperature-regulating mechanism of the body, and the entire nervous and circulatory systems. According to

Haldane,* and others, it is the sensible temperature, or that indicated by the wet bulb thermometer, which the body feels, and the actual or dry bulb temperature and the relative humidity are of minor importance under ordinary air conditions. With a wet bulb temperature above 88° F. in still-air heat stroke is likely to occur even with persons wearing little or no clothing and doing no work, while in the case of persons dressed in ordinary clothing and doing muscular work serious effects may follow at very much lower sensible temperatures. On the other hand, eminent physicians assert that excessively dry air is harmful, causing irritation and thickening of the mucous membranes and aggravation of catarrhal conditions. As to what degree of humidity is most conducive to the comfort of indoor workers is an open question, and undoubtedly depends somewhat upon the nature of the employment.† There is little question, however, that the comfort, and probably the health, of persons employed in the majority of textile processes is affected to a greater or less extent as the wet bulb temperature of the air increases above 70 to 75° F.

Ordinary air always contains a greater or less amount of both dead and living matters in suspension which may have an important influence upon the health. The dead matter or dust, consisting of particles of mineral matter from the streets and pavements and from vehicles and machinery, and of dead organic matter from the floors and walls, from clothing and from the emanations of men and animals, especially when present in excessive amounts, irritates the mucous membrane of the lungs and respiratory passages and render them more susceptible to invasion by the germs of disease. The living matter consists of bacteria, yeasts and moulds which are always present in greater or less numbers, and which have found their way into the air attached to dust particles, or have been projected directly into the air from the body by the acts of coughing and sneezing. So far as is known the yeasts and moulds have little pathological significance, but it is well recognized that the germs of tuberculosis, pneumonia, influenza and perhaps other diseases are frequently transmitted through the air.

RESPIRATORY DISEASES IN TEXTILE CITIES.

Studies of the textile industries in foreign countries have led to the belief that persons employed in them are exposed to conditions and influences which would warrant the classification of these industries among those which are detrimental to health. If the health of textile operatives is unfavorably influenced by the nature of their employment or by characteristics or personal habits which are peculiar to them as a class we should expect this effect to show in the vital statistics of those cities in which a considerable proportion of the population are thus employed.

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*Haldane, Report Departmental Committee on Humidity, etc., 1909, Appendix III.

†A detailed discussion of the physiological effects of temperature and humidity will be found in papers by Leonard Hill, Jour. San. Inst., June, 1911, and Pop. Science Monthly, October, 1912, and in papers read before the Fifteenth International Congress on Hygiene by Lee (this Journal, Nov., 1912), and Kimball, Winslow & Henderson, (Eng. News, Nov. 28, 1912.)

The four great textile cities in Massachusetts are Fall River, Lowell, New Bedford and Lawrence, with an aggregate population of over 400,000 people. In these cities the manufacture of textile goods is practically the only industry of importance, and in the various branches of this industry the great majority of the employed population of these cities is engaged. The returns of deaths from various causes in Massachusetts cities have been published annually in the reports of the State Board of Health since 1894. Comparing the returns of deaths from these four textile cities with those of the whole state during these seventeen years we find that the combined death rate from pneumonia and bronchitis was higher than that of the state in twelve of the seventeen years in New Bedford, in fourteen of the seventeen years in Lawrence, in fifteen of the seventeen years in Fall River and in each of the seventeen years in Lowell. Furthermore, the death rate from consumption was higher than that of the state in fourteen of the seventeen years in Lowell, in nine of the seventeen years in Lawrence, and in eight of the seventeen in New Bedford, and only in Fall River was the death rate from this cause lower than that of the entire state during a majority of the time since the records have been published.

In Table I are shown the average yearly death rates from respiratory diseases in each of these textile cities, in three cities in which the majority of employed persons are engaged in the manufacture of shoes, and in eleven other cities in which the industries are diversified or which are more residential in character, during the three five-year periods between 1896 and 1910. The average death rate from tuberculosis during these fifteen years was higher in Lowell than in twelve, and higher in Lawrence, Fall River and New Bedford than in nine of these other fourteen cities, and the average for the four textile cities is about 11 per cent. higher than that of the three shoe cities, and about 7 per cent. higher than that of the other eleven cities in the list. The difference in the combined death rates from pneumonia and bronchitis in these various cities is even more marked. The mean death rate from these two causes was higher in Lowell and Fall River than in any of the other cities in the table and the mean death rate in Lawrence and New Bedford was higher than in thirteen of these fourteen cities. Taking these cities in groups, the mean combined death rate from these two causes in the four textile cities during the fifteen years is more than 20 per cent. higher than that of the whole state, more than 60 per cent. higher than that of the three shoe cities and nearly 30 per cent. higher than that of the eleven cities having diversified industries.

During the past few years there has been a strong campaign for the prevention of tuberculosis throughout the country, and the effect of this is to be observed in the average death rates for the three five-year periods for all the cities shown in the table. It is to be noted, however, that the reduction in consumption during recent years has been much less in the four textile cities than in the other groups of cities or in the state in general.

TABLE I.

AVERAGE DEATH RATES FROM RESPIRATORY DISEASES IN CERTAIN MASSACHUSETTS CITIES BY FIVE-YEAR PERIODS.

	Population, 1910.	Average Yearly Deaths per 1,000.					
		Tuberculosis.			Pneumonia and Bronchitis.		
		1896–1900.	1901–1905.	1906–1910.	1896–1900.	1901–1905.	1906–1910.
Textile Cities.							
Fall River	119,295	161	172	151	264	283	271
Lowell	106,294	214	164	154	288	280	290
New Bedford	96,652	163	178	139	240	269	263
Lawrence	85,892	139	176	166	228	265	262
Shoe Cities.							
Lynn	89,336	142	122	117	159	180	181
Brockton	56,878	183	161	99	124	105	120
Haverhill	44,115	199	173	140	205	199	209
Cities with Diversified Industries.							
Worcester	145,986	215	177	130	235	241	201
Cambridge	104,839	216	189	153	223	217	206
Springfield	88,926	181	145	102	200	162	185
Holyoke	57,730	161	180	146	175	227	233
Fitchburg	37,826	139	107	92	156	181	189
Taunton	34,259	224	219	168	235	261	299
Pittsfield	32,121	137	160	134	212	227	215
Waltham	27,834	194	161	114	167	189	206
Chicopee	25,401	174	127	117	230	209	255
North Adams	22,019	132	136	109	195	164	186
Northampton	19,431	192	143	129	192	138	180
Averages.							
Four textile cities	408,133*	169	172	152	255	276	272
Three shoe cities	190,329*	175	152	116	163	161	170
Eleven other cities	596,372*	179	159	126	202	207	214
Massachusetts	3,366,416*	189	164	140	229	210	220

* Total Population.

Factors Influencing the Health of Textile Operatives.

From these statistics it is apparent that respiratory diseases are more prevalent in the cities of Massachusetts where the majority of wage-earners are employed in textile manufacturing plants than is the case in cities whose inhabitants find employments in other or in more diversified industries. We should, however, know something of the various factors which contribute to these results, in order to determine to what extent occupation rather than other factors are responsible. The various cities included in the tabulation were selected with the purpose of eliminating certain of these factors. Each of the textile cities is matched by one or more of the other cities in size and general character of population, in geographical location and in general climatic conditions, and in all of these cities sanitation is on practically the same plane. These factors then, while undoubtedly of a certain importance in individual instances, may be eliminated in a consideration of the question as a whole. Other factors which enter into the question are the personal characteristics and habits of the persons employed in the industry, and the environment in which they perform their daily tasks. With reference to the personnel of textile employees, the 1904 report of the Massachusetts State Board of Health states:

> "It is, however, a fact which must not be slighted, that these industries are among the few that are open to persons of weak constitution and poor development. The work in the picking room, carding room, spinning room and weaving room is not of a kind that appeals to most vigorous men who can do better, financially and otherwise, in other lines of usefulness."

Personal habits, also may and probably do, enter into the question. Attention was called to this factor as long ago as 1895 by the late Sir Benjamin Dobson. In his book on Humidity in Cotton Spinning he says,

> "I would suggest from my own knowledge that, beyond the question of the condition of the air in the mill, there is the question of the habits of the workpeople themselves; and I cannot help thinking that the mortality from these diseases might be much decreased if reasonably wholesome precautions were taken against chill by the workpeople themselves. But, as in every trade where there is personal danger, familiarity breeds contempt; and it is nothing uncommon to find workpeople coming from the hot mill to their homes for their meals, and after work is done for the day, when the outside atmosphere is at the extreme from the inside of the mill, with perhaps their shirt wet with perspiration and their chest open to the wintry breeze or the chilling fog. This may be done for a certain number of times with impunity; but the time will inevitably arrive when the border line of immunity is passed, and the accumulated weakness created by previous occurrences is the cause of a grave malady which may or may not be fatal, but even if not fatal, will make a serious breach in the general health of the sufferer . . . The female operatives are, perhaps, as daring in their defiance of the ordinary operations of natural laws; and it is no uncommon sight to see them trooping home in the cold of the winter evening with their mill clothing saturated with perspiration, and their only additional covering a shawl over the head and shoulders, which, although decent and picturesque, is a very inadequate protection against the extreme change of temperature. . . . In addition to this there is the ordinary spectacle in every mill yard, where, at intervals, men, women and children may be seen leaving the warm, dry, comfortable mill temperature, . . . with clothing hot and damp from the heat and perspiration, and cross to the water tap or for other purposes. Add to this bare feet, and I think you have some conditions, at any rate, that will explain the abnormal mortality from the particular class of disease I have mentioned."

This description of habits is as pertinent to Massachusetts mill operatives today as it was to English conditions at the time it was written. While the bare-footed workpeople do not have to "cross the yard to the water tap or for other purposes" in the modern mill, to see a considerable number of male operatives, clad only in overalls and undershirt, enjoying a noon-day smoke outside the mill gates, or a group of female operatives not much more warmly clad assembled at the wide open windows, even in the coldest and most inclement weather is an occurrence so common as to excite no comment in any textile city. Combined with "weak constitution and inferior development" this is undoubtedly an important factor in the causation of consumption, pneumonia and bronchitis. This habit of carelessness to exposure, however, is not peculiar to textile operatives and is to be observed to a greater or less degree in the workers in many other industries. Furthermore, the danger from carelessness of this sort can be reduced only by education of the people themselves, and cannot be controlled by legislation or by activity of the sanitary authorities.

Other factors instrumental in the cause of these diseases, and ones which are or may be controlled to a greater or less extent by legal measures, are those which pertain to the various manufacturing processes. The different textile processes and the conditions common to them, together with their relation to the health of employees, were discussed in detail in the report made by the Massachusetts State Board of Health in 1906. Following are abstracts from that report which fully illustrate the importance of these factors:

> "It has long been known that work which involves constant confinement in a dusty atmosphere predisposes to the development of diseases of the lungs, especially of pulmonary consumption . . . Aside from dirt and other impurities which may be in the stock, it is the opinion of recognized medical authorities that vegetable dusts are markedly inimical to health. Those operatives in cotton mills who are peculiarly sensitive to unhygienic influences may become seriously affected through the constant irritation of cotton dust or "fly" in the upper air passages, giving rise first to dryness of the throat and later to cough and expectoration. Flax dust is thought to be even more irritating than cotton, while dust in the woolen and silk mills (animal origin) is considered to be somewhat less harmful in its effects. . . . We have to bear in mind also in considering the dust problem, the possibility of the presence of "infectious dust" from dried sputum in the air of different mill rooms. Persons suffering from consumption cannot always be detected in these rooms, and the habit of indiscriminate spitting involves the possibility of infection."
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> "There are many departments in which processes are conducted which expose the employees to dust; but the weaving, spinning, carding and waste rooms illustrate the important unhygienic conditions commonly associated with this disturbing element. In some weave rooms the air is so filled with dust as to present a hazy or "smoky" appearance. . . . Dust in spinning rooms is more constant and is greater in amount than in weave rooms. . . . In a course-goods mill, where waste stock is used in a low-studded and generally neglected room, the amount, constancy and character of the dust is such as to suggest the probability of real danger. The principal features of the card room are, the amount of dust, and lack of proper ventilation and effective means of removing the dust. . . . The quantity of dust is com-

monly sufficient to cause a distinct cloudiness of the atmosphere, which, in a room lacking proper ventilation, is a serious menace to the health of the operatives. In the assorting or waste room, "sweepings" are picked over and the different grades separated. Here may be found numerous kinds of waste and dirt, including that which comes from the floors of the card and spinning rooms, and, of most importance, sputum in large quantities, which may contain the exciting causes of infective diseases of the respiratory tract."

"In both weaving and spinning departments there are a number of other unsanitary influences which may affect the health of the workers, the effects of any one of which are not susceptible of correct measurement. . . . There is commonly an excess of moisture with unnecessary heat in weave rooms, and excessive heat with frequently undue moisture in spinning rooms. . . . Scarcely any effort is made on the part of most manufacturers to ascertain the definite conditions with respect to heat and moisture favorable to weaving. . . . The raising of humidity is done in a very unworkmanlike manner. . . . That heavy or excessive steaming in mills is injurious to the health of those who work in them has been for years the opinion of competent physicians. . . . Poor light is also a factor of no mean consequence in reducing the physiological resistance to disease. . . . It is impossible to ignore the probability that many individuals working in dirty, unpainted, overheated rooms, with impure air and excessive moisture, use up a great deal of nervous energy and suffer from eye fatigue or eye strain and its consequences."

"A room with poor light, unnecessary high temperature, dust, and an excess of moisture, is not, from a sanitary point of view, a desirable room to work in. . . . Add to these unhygienic influences two prominent factors which enter into health conditions, want of cleanliness and lack of provision for a plentiful supply of fresh air, and a class of rooms is represented which is conspicuously common among the weave and spinning mills in this State."

Reasons for Artificial Humidification.

It is now quite generally appreciated by mill managers that the humidity of the air is an important factor in the manufacture of textile fabrics. The former supremacy of certain English localities as textile centers was due to the naturally favorable climatic conditions, and the recognition of this fact led to the adoption of artificial means of increasing the moisture of the air in mills less favorably located. In this country the question of humidity received scant attention for many years. Within the last few years, however, systems of artificial humidification have been installed in practically all of the larger and more modern mills as well as in many of the smaller and older ones.

The fibrous materials used in textile processes are directly influenced by the presence and amount of moisture in their substance. When the fibers contain a certain proportion of moisture they are elastic and cling closely together and may be carded, combed, drawn out and spun into yarn, and woven into cloth, more easily than when dry. Under such circumstances the work in all these departments runs better and smoother, finer grades of goods may be made from the same stock, there is less waste, and the machines may be run at higher speed with less attention from the operatives. In a dry atmosphere the stock loses much of its moisture, the individual fibers become harsh, stiff and bristly and when drawn out and twisted into yarn the ends stand out in all directions. Each fiber so lying outside the twist escapes its duty in contributing to the strength of the yarn. Electrification by friction, which is largely increased when the stock is dry, further contributes to this state by causing the fibers to repel one another. Yarn spun under these conditions is harsh and kinky, does not retain its twist, and breaks easily during the various manufacturing operations. Too much moisture in the stock, however, is a decided disadvantage in many of the operations. If the degree of moisture in the stock varies, as is the case when the natural humidity of the air fluctuates through any considerable range, a constant adjustment of the machines is required in order to keep the proper tension upon the yarn. As the temperature of the air increases, its affinity for water vapor also increases, and with higher temperature a greater relative humidity of the air is necessary to prevent the necessary moisture in the yarn from being lost through evaporation.

Much of the power used in textile mills is ultimately converted into heat. Much of this heat, however, is absorbed in the evaporation of water, the heat required for the evaporation of one pound of moisture per minute being equivalent to that generated by twenty-five horse-power of machinery. A proper system of artificial humidification, therefore, not only serves to correct the deficiency in humidity but also helps to control the temperature. With these facts in mind it is evident that the use of artificial humidification is a distinct advantage to the manufacturer. From the viewpoint of the operative also artificial humidification is desirable in many particulars. As the work runs more smoothly and evenly and there are fewer breaks and defects to watch for and repair, the tax on his nervous energy is greatly lessened, while the fact that dust and "fly" are appreciably reduced and much of the excess heat is absorbed contributes to his health and comfort. His earnings may also be increased to some extent, as he is enabled to turn out both more and better work. The temperature and humidity most suitable for obtaining the best results in each process with material of different character and quality have been determined with considerable care, and generally speaking have been found to be such as would not be unduly prejudicial to health. With the development of the artificial humidification idea, however, and the appreciation of its benefits, the disadvanatages of excessive moisture have frequently been overlooked, and amounts of humidity have been introduced which were not only detrimental to the work but also extremely bad for the workers. It is this feature, rather than any prejudice against the introduction of artificial moisture which has made laws limiting the amount of humidity necessary.

METHODS OF INCREASING HUMIDITY.

There are numerous types of apparatus for increasing the humidity of textile mills, some of which depend upon the introduction of moisture directly into the mill rooms, and others upon treatment of the air forced into the rooms by some system of mechancial ventilation. The introduction of the moisture directly into the air of the mill rooms is the plan most commonly used in Massachusetts mills and was the only plan found in the mills covered by this investigation. From a sanitary viewpoint it makes little difference whether the moisture is introduced into the air before or after it reaches the mill room. The method by which the moisture is introduced, however, may have considerable sanitary significance. It is well known that when water vapor is produced by evaporation from a moist surface, all solid impurities are left behind. The mere fact that evaporation is accelerated by increasing the temperature of the water or air or both, or by bringing larger volumes of air in contact with the water, does not enter into the question provided the surface from which evaporation occurs does not become dry. On the other hand, a drop of water discharged into the air and evaporated before reaching the floor or other surface must completely disappear as water, leaving its impurities floating in the air. Moisteners constructed on this principle, therefore, introduce into the air those bacteria which existed in the water supply. This difference in effect is of the utmost importance, and has to be kept constantly in mind in any consideration of the quality of mill air.

The simplest method of producing artificial humidity in mill rooms is by sprinkling water upon the floor and trusting to natural evaporation. This method known as "degging" was widely practiced at one time, and is still used, or was until recently, in some foreign mills. This practice is objectionable to the operatives who believe that constant standing upon a wet floor is conducive to rheumatic troubles. Early improvements upon "degging" were the provision of shallow channels in the floor for the water or the placing of shallow pans of water about the room. Another practice, almost or quite as old as that of "degging" and one which is still used to a certain extent in some of the smaller and older mills, is that of introducing steam into the room. In some instances the steam is blown directly into the air, but usually the steam is turned into deep cans to prevent the dirty water and oil which it may carry from damaging the goods in the process of manufacture. The use of steam is objectionable for the reason that it unduly increases the temperature of the rooms.

The modern types of humidifying apparatus are all evolutions from one or the other of these older practices. There are two general types of modern apparatus in which natural evaporation from a moist surface is relied upon to increase the moisture of the air. In one of these the moist surface is supplied by cloths which are kept constantly saturated with water and in the other by plates over which a thin film of water is constantly flowing. In both cases the air is circulated among the cloths or plates by a fan or blower and considerable power is required for their operation. It is claimed that apparatus properly constructed and operated on this principle not only adds nothing to the germ content of the air, but on the contrary should act as an air purifier by removing much dust, bacteria, etc.

The spray moisteners are made in a large variety of patterns. Some are constructed on the principle of the common household atomizer, water being sucked up and blowing into the air as a fine mist by a jet of steam or compressed air. In other types the water is thrown off as a fine spray from a brush or disk revolving at high speed in a box through which a current of air is forced. The types most commonly found in Massachusetts mills, however, are those in which a spray produced by a fine stream of water under high pressure passing through an orifice of special construction, or by the interference of two or more such streams, is projected directly into the air of the room. In apparatus of this character the spray nozzles are almost always located inside a housing and deflectors are provided to distribute the spray and to collect any water which is not atomized. The apparatus being open at the top, some air is drawn through this machine and is washed to a certain extent, but as no other mechanical means is used to ensure a circulation of air through the apparatus this effect is relatively small. In all of these types of apparatus, the excess water is usually collected and after being passed through a strainer or filter to remove the dirt is returned to the apparatus, and when the quality of water used for humidification is involved, as is the case under the Massachusetts law, the efficiency of such filters as well as the initial quality of the water supply of the mill has to be taken into consideration.

SCOPE AND METHODS OF INVESTIGATION.

In the limited time and with the force at our disposal it was out of the question to attempt a complete investigation of all of the textile mills in Massachusetts. After a careful survey of the field, therefore, certain mills were selected for study in which all of the processes usually employed in the manufacture of cotton and woolen cloth were in operation and in which the range of conditions was thoroughly typical of those common to the cotton and woolen industry in Massachusetts. In all, the conditions in portions of six different mills, in which some 17,000 persons were employed were studied, four of these mills being engaged in the manufacture of cotton goods and two in the manufacture of woolen goods. In the trade there is a distinction between woolens and worsteds, and the processes of making them differ to some extent, but so far as the subject matter of this paper is concerned the conditions in the manufacture of each are quite similar, and the term "woolen" may be understood to include both. Furthermore, the distinction between cotton and woolen goods is not a sharp one from this viewpoint since the essential manufacturing operations in both branches of the industry differ only in detail, and more or less cotton is mixed with the wool in the manufacture of many grades of so-called woolen cloth. While the manufacture of knit goods was not covered by the investigation, this branch of the textile industry differs from those studied only in the manner in which the yarn is interwoven to form a fabric, and the atmospheric conditions and requirements in the knitting room are not unlike those in the weave room.

Throughout the investigations determinations were made of the temperature, humidity and bacterial content of the air and analyses were made of the water used for humidification, and wherever filters or other apparatus for purifying this water were found, tests were made of the bacterial efficiency of such filters. In addition, data as to variations in temperature and humidity were obtained from the officials of certain mills in which more or less complete records have been kept, and comparisons of the readings of the various types of hygrometers with the standard instruments used in the investigation were made under actual mill conditions wherever such instruments were found installed.

The portion of the law limiting the degree of humidity applied only to the spinning and weaving departments, but that relating to the quality of the water used for humidification was less specific and might be construed to apply to all departments. For this reason while particular attention was given to the conditions in spinning and weaving rooms, the investigation was extended to cover typical conditions in practically all of the other rooms where humidifiers were used and, for purposes of comparison, examinations were made of the conditions in many rooms where there was no artificial humidification.

The sling psychrometer, in the modified form used by Soper in the study of air in the New York subway, was employed throughout for the determinations of humidity. This is essentially the standard instrument recommended by the United States Weather Bureau, but is constructed of aluminum and has an aluminum case with bayonet lock and carrying strap. The relative humidities corresponding to the difference between the actual (dry bulb) and the sensible (wet bulb) temperatures have been taken from the standard tables furnished by the United States Weather Bureau (U. S. Dept. Agr., W. B. Bull. No. 235). The humidity values given in these tables differ to some extent from those in tables supplied to the mill officials by the makers of many types of humidifiers and hygrometers, and from those stated in both the Massachusetts law and in the English regulations, all of which are based on the English or "Glaischer" tables.

After a careful comparison of a number of different methods for determining the numbers of bacteria in the air, it was decided to use the sand filter method, essentially as recommended by the A. P. H. A. Committee on Standard Methods of Air Analysis, and to make comparative tests by the exposed plate method. As an added factor of safety, three sand filters were used in series in each determination instead of two as prescribed by the standard methods. The wisdom of adding the third sand tube was evident from the fact that a few bacteria were occasionally found in this tube which had passed through the first two tubes. The sand tubes were sterilized individually by dry heat and then fitted together with rubber connections which had been sterilized by alcohol. For convenience in handling each set of three connected filters was placed in a brass tube closed at each end by a rubber stopper. A large bicycle pump with reversed valves was used to draw the air through the filters, the capacity of this pump being calibrated each day. Some trouble was experienced at first by back-pressure from the pump disturbing the sand, this being finally eliminated by the insertion of a Bunsen valve in a small suction bottle filled with water between the pump and sand filter train. Fifty liters of air were drawn through the sand for each sample. During the first part of the investigation four plates were exposed for each sample, one with agar, one with litmus-lactose agar and two without media, agar and litmus-lactose agar being added respectively to the two dry plates after they were returned to the laboratory. As there was practically no difference in the counts on the wet and dry plates, and as the latter were far more convenient, dry plates only were used during the greater portion of the investigation.

As soon as the samples were received at the laboratory, the sand from each filter tube was mixed with 10 cc. of sterile water, shaken thoroughly, and after standing one minute for the sand to settle, fermentation tests and agar and litmus-lactose agar plates were made of the supernatant water. All agar plates were incubated four days at 20° C. and litmus-lactose agar plates eighteen hours at 40° C. before counting, both total and red colonies being counted on the latter. Moulds were counted on all plates when present. Fermentation tubes were incubated eighteen hours at 40° C., all positive fermentations being tested for the presence of B. coli by the regular Lawrence procedure. All counts by the sand filter method were multiplied by a factor, the results being expressed as bacteria, etc., per cubic meter of air. For the purpose of averaging results from different samples, all samples which contained less than 200 bacteria per cubic meter, *i. e.*, contained no bacteria in five liters, were assumed to contain 100 bacteria per cubic meter. The results of fermentation tests have been expressed as "+" or "0" in five liters of air.

In collectiong samples an ordinary camera tripod with an enlarged top was used as a support for the sand tubes and exposed plates, the intake of the sand tube and the exposed plates being located about two feet apart and about five feet above the floor.

(*To be concluded.*)

A DISCUSSION OF THE PROBLEM OF FISH LIFE IN CONTAMINATED STREAMS.

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Read before the Sanitary Engineering Section, American Public Health Association, Washington, D. C. September, 1912.

The writer regrets that it has not been possible for various reasons to present the result of experiments on fish life carried on by Mr. Langdon Pearse and the writer at the Sewage Testing Station of the Sanitary District of Chicago.

There is a distinct lack of precise experimental work on the relation of raw, settled, septic and biologically treated sewages or sewage mixtures, as well as trade wastes, to fish life in surface waters in this country.

The fundamental work on this subject has been undertaken by two Germans, Weigelt (Arch. Hyg. 1885) and König ("Die Verunreinigung der Gewässer," 1899, vol. 2). A few of the other observers were Richet, Haselhoff, Richter, Hofer, Kämmerer, Grandeau, Bert and Ohlmüller. Their investigation dealt principally with trade wastes. Weigelt observed the influence of putrid residential sewage upon trout, salmon and char in very exhaustive experiments. Hoppe-Seyler and C. Duncan (Z. physiol. Chem. 1893) demonstrated the effect of various amounts of oxygen in water upon trout and tench. Other observers of this phase of the problem were Jolyet and Reynard, Walter and Hofer. The work done by these men is of interest to ichthyologists here but should not be accepted as conclusive as far as American conditions are concerned. Even where the foreign experiments deal with the observations on the influence of certain chemicals added to the water upon fish life, the results may be applicable to our conditions only with certain limitations. Certain species common to surface waters here are rare abroad and species in which we are particularly interested have not been experimented on abroad at all. Now we know that various species will differ quite materially in their resistence towards chemical compounds or trade wastes and that even one and the same species inhabiting surface waters of different quality may show deviation in this respect. As far as sewage is concerned the European experiments are without doubt of little value to us. They deal with a much more concentrated liquid, which as a consequence decomposes quickly, forming products toxic to fish. The water-carrying capacity of our rivers is on an average much greater than abroad. Besides, here too we are interested in species uncommon in Europe.

In the American literature we strike occasionally references to casual observations on the relation of trade wastes to fish life but to the writer's knowledge no systematic attempt has been made to go into it thoroughly. Very meritorious work of this kind is done by the United States Bureau of Fisheries and it is to be hoped that others will take up investigations of this kind, which will prove of great importance to the fish industry in this country.

CERTAIN PHASES AND FALLACIES OF AMERICAN INFANT MORTALITY STATISTICS

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Prepared at invitation of, and read by title before the Section on Vital Statistics, American Public Health Association, Colorado Springs, September, 1913.

President Lincoln once sadly remarked that he supposed there never was a boy so fond of gingerbread as he had been who had gotten so little of it; and that observation might be paraphrased to apply to American vital statistics. Probably no other nation ever has shown so deep an interest in its vital statistics as the American people has displayed of late, or appropriated anything like as much money for their compilation, and, nevertheless, had so much trouble in securing even reasonably complete and reliable birth and death returns.

Of course, it is scarcely necessary to observe to the members of the American Public Health Association, the difficulty in securing adequate vital statistics for this country is by no means due to any shortcomings on the part of our national statistical headquarters, the Bureau of the Census, the decided expansion of the registration area and vastly improved returns of the last decade being largely due to the persistent and intelligent work of the Bureau's Division of Vital Statistics. The difficulties in the way of obtaining the desired data are fundamentally chargeable to two unique features of the American situation, to wit: (1) to our system of democratic government, including as it does half a hundred sovereign states, which in such matters are entirely independent; and (2) to the many and varied complications of the most cosmopolitan of all populations of modern times, in which practically all races and languages of the present era play more or less part. Owing to the constitutional limitations of this nation's central government, and the right of each state to say for itself how much or how little attention shall be paid to the compilation of its vital statistics, neither a national code nor an uniform set of state laws for the registration of births and deaths is possible. To make matters worse, more than one tenth—10.7 per cent.— of the American population at last reports consisted of negroes, for the most part illiterate; and an even 35 per cent. of the population of Continental United States according to the same authority, the Thirteenth Census, was either foreign-born or of foreign or mixed parentage, and hence more or less unfamiliar with the details of our language, our laws, and our customs. These two factors,

factors without a parallel in the case of any other nation, make the collection of this country's birth and death returns a veritable case of "confusion worse confounded."

Infant mortality might fairly be termed a special branch of vital statistics, and any man having even a bowing acquaintance with the branch in question will realize on a moment's thought that practically any and all of the difficulties in the compilation of vital statistics in general operate with special, intensified, force in the case of infant mortality statistics. Even in the lowest walks of life, the adult is invested with a certain individuality and is personally known to enough people to make it comparatively easy to obtain from one source or another sufficient data as to his name, nationality, occupation, age, cause and time of death, etc., for the death certificate required in all civilized communities of the Occidental world as an inevitable condition for a burial permit. With that mere human atom, the baby, the case is very different. Whatever distinctive character from the viewpoint of the proud father and mother the new arrival may possess, in so far as the busy, practical, outer world is concerned the average new-born is only one more embryonic individuality, which often disappears without leaving so much as a name behind it. Small wonder is it that, except with the most thoroughly systematized methods of birth and death registration as a guarantee against slips of omission, many a baby is born, and breathes a few hours, or days, or weeks, and dies—or even persists in living and growing up—without figuring at all in the vital statistics of his country. In the case of a nation confronted with so many and so unusual obstacles in the way of complete registration as is the United States, of course the possibilities of such oversights and the resultant defective vital statistics are materially greater than in practically any of the European countries where this phase of governmental work long since became thoroughly systematized. Taking into account our considerable negro population—especially in the Southern States, without the boundaries of the registration area—our congested foreign populations in many of the larger cities with extremely lax registration requirements, the vogue of midwife service in those city Babels under the loosest of supervising methods in many cases, obviously there are many phases of American infant mortality statistics which are indigenous and unfortunate.

The Real Utility of Infant Mortality Statistics.

A thoroughly up-to-date definition of the basic purpose of vital statistics, as now interpreted, was concisely stated by Dr. Reginald Dudfield, chairman of the Royal Statistical Society's Special Committee on Infantile Mortality, in the address before the Society on November 19, 1912, with which he opened the discussion of the Special Committee's voluminous report. As Dr. Dudfield put it: "Whatever may have been the original aims and intentions of those who initiated the registration of births and deaths, there can be little room for doubt that at the present time the principal function of vital statistics, the natural outcome of registration, is the examination of the causes of unnecessary and preventable wastage of life and (but not to so general an extent) of sickness. Vital statistics may, in effect, be regarded as taking the place of laboratory experiments in social physiology and pathology. If such views be accepted as correctly representing the functions of statistics, it is evident that sound conclusions cannot be obtained unless the basic data are reliable and accurate, and the methods of calculations used by different inquirers uniform, or at least strictly comparable."

This definition of the principal function of vital statistics at the present time is exceptionally applicable to infant mortality statistics, the moving cause for the steadily increasing public interest in this phase of vital statistics, by common consent, being the growing conviction of the thinking community that not only the public conscience but the public welfare demand a careful study of the causes for, and vigorous action for the prevention of, unnecessary and preventable wastage of infant life. Dr. Dudfield's warning that "sound conclusions cannot be obtained unless the basic data are reliable and accurate, and the methods of calculations used by different inquirers uniform, or at least strictly comparable," even still more emphatically applies to the collection of statistical data regarding infant mortality.

As yet, there is practically not even a semblance of a basis on which to rest any tentative computation of the probable infant mortality rate of the United States as a whole. Any estimate, however expert, would be the merest guesswork, and it would be almost as hopeless to try to fix the infant death-rate for any section of the United States, or for any single state as a whole—with possibly two or three exceptions. In its discussion of infant and child mortality, *Bulletin 112* of the Bureau of the Census, presenting the annual mortality statistics for 1911 and recently issued, frankly concedes the hopelessness of the present statistical situation on these lines, thus stating the case: "Unfortunately, owing to the generally incomplete registration of births in the United States, it is impossible to present satisfactory rates of infantile mortality for the great majority of the states and cities. Even for the registration states—that is, the states in which the registration of deaths is regarded as at least approximately complete—and for many of the cities of 100,000 population and over this cannot be done."

This shameful fact—and it can only be considered a "shameful fact" when one of the greatest and wealthiest nations is compelled to plead guilty to it—is probably so generally known to the members of this Association that any further discussion of it at this time and place would be a mere waste of words. Bad as it is, that is the condition which confronts us Americans, and the sole question, as I see the situation, is, what are the principal causes for this condition which are possibly remediable within reasonable time limits, and what are the practicable remedies?

The report of the Special Committee on Infantile Mortality, appointed by the Royal Statistical Society of London, was published in June, 1912, presented in great detail the results of the committee's exhaustive investigation of "the systems adopted in different countries for the registration of births (including still-births)and deaths with reference to infantile mortality," and in its appended tabulation of the responses from 103 registration officers to its inquiries undoubtedly supplies the most comprehensive and concise summary of the registration methods of the several states of this country ever furnished in printed form, in so far as I am aware. The tabulation of responses to the special Committee's various questions contains more or less specific answers from twenty-six states of this country, and with the exception of Iowa and North Carolina every one of these states answered "yes" to the leading question: "Is the registration of births and deaths compulsory?" Connecticut, Maryland, Massachusetts, Montana, New Mexico, North Dakota and Ohio, in their answers to the question, "What is the penalty for omission to register?" specifically name penalties for omission to register births, but the other states either make no answer to the question or make the ambiguous reply of naming a general penalty without showing whether or no it applies to non-registration of births or only to failure to register deaths. A footnote shows that the law of the District of Columbia applies to both births and deaths, and New York state now has a new law, which becomes operative on January 1, 1914, and provides for the registration of all births in the state within five days.

It might seem at first reading of these categorical replies from the registration officials of twenty-six states, or presumably persons authorized to answer for them, that at least approximately one half of the states of this country already had the laws necessary for the registration of births as well as deaths, but it is entirely unnecessary for anyone even casually familiar with the defective birth-registration of practically all of the states —with the possible exception of Massachusetts, Rhode Island and Connecticut—to take the trouble to read the responses of the various states to the driving question, "Do many births or deaths escape registration?" In other words, the evidence is conclusive that in the great majority of cases the American laws providing for compulsory registration of births as well as deaths are not actually enforced, and are practically dead letters. Apparently but one of two interpretations of such a state of affairs is possible, namely, that either the laws in question are so defective as to be unworkable, or that no serious effort to enforce the statutes is really made by the officials whose duty it is to enforce them. The latter interpretation is, doubtless, the correct one in most if not all cases, and presumably the inaction of the officials concerned is primarily due to their suspicion that as yet there is no real public sentiment behind the laws for the registration of births. This *laissez-faire* official construction of the situation is probably correct in many if not most cases in point, but the public appreciation of the importance and varied utilities of birth registration is slowly but surely broadening, under the educational campaign inaugurated by this Association and many of its energetic members, and it now seems probable that a potent public sentiment in favor of a new order of things is gradually taking definite shape. While the present state of affairs in the matter of woefully defective birth-registration is deplorable, the clouds are lightening up, and the prospects are decidedly encouraging. For instance, in this, as in many other phases of the infant mortality campaign, the greatest of American cities is blazing the way, and quietly proving by actual results what can be done to better conditions, even in the most cosmopolitan—and in some places the most congested—city in the world. In 1910 the Department of Health of New York City instituted proceedings against forty-five physicians and midwives who had failed to report births in the city within the ten days named by the city's charter (Section 1237), and settled twenty-two of these cases upon payment of the penalty. It entered on 1911 with twenty actions pending and during the year brought 260 new actions, and by the end of the year had settled 233 actions on payment of the penalty. As an immediate outcome of the department's vigorous effort to enforce the law, it is believed that 95 per cent. of all the births in Greater New York are now annually registered.

A Bed-Rock Basis Imperatively Needed.

When a new "sky-scraper" is added to the maze of brick and stone and steel towers which has developed of late years at the lower end of Manhattan Island, the builders invariably sink their caissons so as solidly to rest on the bed-rock foundation of the metropolis, however far depressed the rock may be at that particular section of the island, and however much time, and labor, and money cost may be involved in the foundation work. Of course this method of sky-scraper building is not a builders' hobby, but a matter of sheer necessity. And a similar necessity confronts the would-be compilers of all safe and sound vital statistics; if their work does not rest on solid foundations, the higher they build the more the structure which they have created will be out of plumb.

In the compilation of general death-rates, as a rule practically complete returns of the deaths in the community are available, and, while actual census counts of population are not made in any case oftener than by five-years periods, long experience has qualified experts to estimate with reasonable accuracy the probable total population for any inter-censal year, thus making possible the computation of a general death-rate with scarcely an appreciable margin of error. And except in the case of abnormally fluctuating populations, by similar processes corrected death-rates of approximate accuracy can be worked out by age-groupings of the population, the only serious danger of error being in the estimates for the very earliest ages. Even in census counts, the returns for the population under one year of age are confessedly unreliable and inaccurate. In his comments on infantile mortality, in the report on Vital and Social Statistics of the Eleventh Census, the late Dr. John S. Billings declared: "Unfortunately, these data are incomplete and inaccurate, not only for the United States as a whole, but for all parts of the registration area. This is due to the fact that the number of children returned as being under one year of age is too small in every locality, owing partly to omissions in the enumeration, and partly to the tendency of those reporting the age of infants to report those who are between nine and twelve months of age as being, in round numbers, one year old, which last is a defect common to the censuses of all countries."

The figure for the population under age 1 being entirely unreliable, whether based on census returns or on estimates for inter-censal years computed from those returns, it obviously follows that even the most carefully calculated infant mortality rates worked out by dividing the number of infant deaths by the supposed population under age 1 are necessarily incorrect, and of comparatively little value. On the other hand, if there is a complete registration of living births and deaths under age 1,—however short the period of life—the calculation of infant mortality by the division of the number of infant deaths by the number of living births rests on as solid a bed-rock foundation, as do the great sky-scrapers of New York City. For these reasons the vital statisticians of Europe long since discarded the former method of working out infant mortality rates as practically worthless, and concurred that the only reliable, scientific, method of calculating infant mortality is that of working out the ratio of infant deaths to living births. As the report of the Special Committee on Infantile Mortality, of the Royal Statistical Society, shows, Spain was the only nation in Europe reporting to the committee which then calculated its infant mortality on the basis of the ratio of deaths under age 1 to the supposed population under age 1. Anhalt, Saxe-Meiningen, Mauritius, Cuba and Uruguay were the only other divisions or countries in all the world, outside of this country, which reported their continued allegiance to the old-time method, but Indiana, Iowa, Maryland, Michigan, Minnesota, Nebraska, New Jersey, and Ohio similarly confessed. Practically all of the civilized world outside of the United States now calculating its infant mortality on the only rational, scientific, basis, the lack of the data needed to enable this country to fall into the procession of civilization and follow the almost universally accepted course might almost be considered as one of the distinctive phases of American infant mortality statistics.

There is but one possible method of substituting the scientific for the unscientific process of computing the infant mortality of this country, and that, of course, is the collection of practically complete birth returns. Thanks to the determined educational efforts of the Bureau of the Census, of this Association, and of certain other intelligent influences, there are now abundant indications that this desideratum will sooner or later be attained. At least the younger members of this Association may even live to see the day when the vital statistics of the United States will have so far advanced as to justify their inclusion in the international records annually published in the reports of the registrar-general and other recognized European authorities on the world's vital statistics; but up to date the nearest approach to such recognition of the supposed vital statistics of one of the leading nations of the earth that the registrar-general's office has felt justified in making has been the publication in recent reports of a brief summary of population and death figures for the registration area furnished for the purpose by Dr. Cressy L. Wilbur, chief statistician of the Division of Vital Statistics of the Bureau of the Census. As a matter of course, Dr. Wilbur was compelled to omit from this tabulation any infant mortality figures for this country.

Some Distinctively American Statistical Shortcomings.

An unfortunate, but none the less inevitable, by-product of the steadily-improving registration of births in many states and cities of this country is the resultant inaccuracy in the yearly comparisons of the apparent birth rates and infant mortality rates for those states and cities. As the percentage of actual births duly registered increases, even though the real birth-rates and infant mortality rates remain absolutely unchanged the *apparent* infant mortality rate, of course, will decrease, and the *apparent* birth-rate increase, unless the gain through improved registration of births is more than offset by the general decline in the world's birth-rates or by immigration or other abnormal factors. By way of illustration, suppose that a city of an even 1,000,000 population were to have an actual birth-rate of 25 per 1,000, but that only 80 per cent. of its births were registered, thus making its apparent birth-rate 20 per 1,000. By the time the city's population had risen to 1,200,000 a constant birth-rate of 25 per 1,000 would mean 30,000 actual births, and if the birth-registration had by this time so increased that 90 per cent. were registered, the 27,000 reported births would have lifted the *apparent* birth-rate from 20 per 1,000 to 22.5 per 1,000. Should the actual birth-rate of 25 remain constant, the population increase to 1,300,000 and the percentage of registered births rise from 90 to 95 per cent., the city's vital statistics would record 30,875 births, or a birth-rate of 23.75 per 1,000. In short, although the birth-rate in this hypothetical case had actually undergone no change whatever, the increase from 80 to 95 in the percentage of registered births would have resulted in apparently lifting the city's birth-rate from 20 to 23.7, thus showing a fictitious gain of 18.75 per cent., or nearly one-fifth, and making any annual comparisons of its supposed births and birth-rates grossly misleading.

It goes without saying that, even though the actual infant mortality rate of the city were to remain unchanged, the division of the annual returns for infant deaths by the improving annual returns for births would mean an *apparent* steady decline in the infant mortality rate, and thus make a true comparison of the annual infant mortality rates physically impossible unless in the earlier figures for registered births proper allowance was made to offset the improved birth registration. At the present time it is supposed that as high as 95 per cent. of all births actually occurring in New York City are registered, but Dr. William H. Guilfoy, the registrar of records, concedes that perhaps not more than 80 per cent. of births were registered as recently as 1900, and some authorities believe that the ratio of registered to actual births at that time did not exceed 65 per cent. In other cities the margin of improvement in birth registration in that same short period may have been even greater. On the basis of an increase in births registered from 65 to 95 per cent. of the actual number, there would be an apparent increase of 46.15 per cent. in a birth-rate actually remaining stationary, and in case of an increase from 80 to 95 per cent. in registration the apparent increase in a stationary birth-rate would amount to 18.75 per cent. Other things being equal, there would be corresponding decreases in the infant mortality rates although the infant mortality rate had actually remained constant. Do not these figures emphatically demonstrate one of the foremost fallacies of our American infant mortality statistics—except in the rare cases in which suitable allowance has been made for the changes in the percentage of birth registration?

That there has been a real decline in the infant mortality rates of the states and cities of this country, as there unquestionably has been for the most part in European countries, I do not for a moment doubt. The mere *decrease in the number* of infant deaths registered in the last few years—with the percentage of actual infant deaths registered undoubtedly increasing instead of decreasing—and the population in practically all cases steadily increasing—is the strongest possible proof of such a decrease in the ratios of babies dying to babies born alive. It might be argued at first thought by extreme conservatives that a declining birth-rate would possibly account for the decrease in the number of recorded infant deaths, even though there were no real decrease in the infant death-rate, but the more or less constant influx of immigrants to this country—in the main made up of the most fertile of European peoples—probably has substantially offset the undoubted decline in the birth-rate of our native stock in recent years.

In its observations on infant and child mortality *Bulletin 112* of the Bureau of the Census positively asserts that "there has been a marked reduction in the infant death-rate in recent years." I am not sure that I have yet seen entirely satisfactory proofs of any such "marked reduction" in the case of any considerable number of American cities, but the entirely reliable English and German statistical records demonstrate that there undoubtedly has been such a reduction in the infant mortality rates of those countries, and probably the causes responsible for that reduction have also been operative in this country. In England and Wales the average infant death-rate for 1891–1900 was 153 per 1,000 living births, as contrasted with one of 127 for 1901–1910, and for the last four years the rates have been as follows: 1909, 109 per 1,000 births; 1910, 105 per 1,000 births; 1911, 130 per 1,000 births; 1912, 95 per 1,000 births. With the exception of 1911, when the trying summer period was unusually hot and dry, of late years the decrease in the infant mortality rates of practically all foreign countries with reliable records has been practically continuous.

That eminent authority on vital statistics in general, and infant mortality statistics in particular, Dr. Arthur Newsholme, medical officer to the Local Government Board for England and Wales, has recently supplemented his many notable contributions to the literature of infant mortality with a voluminous study presented in the Forty-Second Annual Report of Local Government Board, and in that report thus comments on the recent general decline in the infant mortality rates of his country:

"A dispassionate review of all the circumstances makes it highly probable that this decline has been, in large measure, brought about by the improved sanitary circumstances of urban populations, by increased attention to municipal and domestic cleanliness, by the education of mothers in personal hygiene, especially in regard to food and the care of infants, and by elevation of the standard of conduct and moral responsibility."

This calm and expert analysis of the causes for the recent reduction of England's infant mortality probably applies word for word, and comma for comma, to this country, although we have not as yet by any means as a nation gone about the reduction of infant mortality in the practically universal and thoroughly systematized manner in which England has tackled the job. In certain spots—especially in that greatest of American spots, New York City—we have seriously grappled with the problem, but not as yet on a nationalized basis. Within the limitations of its extremely narrow appropriation, the new Children's Bureau, at Washington, is trying to make a broad investigation of the various phases of the problem; the

New York Milk Committee, the American Association for the Study and Prevention of Infant Mortality, and various other promising agencies are coöperating, and the prospects are encouraging. Since 1910 the deaths under age 1 in Greater New York have dropped from 16,215 in that year to 15,053 in 1911, to 14,289 in 1912, and up to August 30 the total of infant deaths in New York City during the present year was but 9,551 as compared with 9,909 up to the end of the corresponding week of 1912, according to the tabulations of the Babies' Welfare Association, of New York. There can be no doubt that the excellent work of the Board of Health's Division of Child Hygiene in recent years, the fifty-five milk stations now maintained at municipal expense as an outcome of the New York Milk Committee's vigorous campaign in 1911, the twenty-two other milk stations now run by private agencies, and the systematized efforts of the recently organized Babies' Welfare Association are largely responsible for the decided decrease in infant deaths in New York since 1910.

OUR APPARENT STEADY INCREASE IN INFANT DEATHS FROM WASTING DISEASES.

Despite all the strong indications of a probable decrease in this country's infant mortality rate in the last few years, in default of complete statistics of births and infant deaths we do not *know*, and cannot prove, that there has been a decrease in the infant death-rate for the country as a whole, though we can substantially so prove for certain large cities like New York and, perhaps, for Massachusetts and one or two other New England states. We have the total number of supposed deaths under age 1 in the registration area for each of the twelve years 1900–11, and the supposed numbers of these deaths due to each of the numerous recognized causes, but in default of accurate figures for the number of living births in each of these years we are necessarily more or less at sea as to whether the infant mortality rates for individual causes of infant deaths have really gone up or down. This fact is especially unfortunate in the case of that group of all important causes of infant deaths which Dr. Newsholme terms "developmental and wasting diseases," and which includes deaths charged to diarrhœa and enteritis, malformations, premature birth, congenital debility, and injuries at birth. As I have shown in one of the tables appended to this paper, the total number of deaths charged to these five causes in the registration area has increased from 55,558 in 1900 to 88,465 in 1911, but the mere increase in number would mean practically nothing in view of the steady increase in the registration area and its population and presumable number of births between the years 1900 and 1911. If the complete birth returns were available, it would be an easy matter to work out the ratio of deaths from each of these five causes to births, and, if there had been no important changes in the methods of reporting and classifying deaths under these headings, we should then positively know whether the movement on these lines was upward or downward.

Having no birth returns for the registration area on which to work out the ratios in question, the one available method of attempting to determine the rise or fall in the curve of infant deaths from "developmental and wasting diseases" is to compute the ratios of the deaths assigned to these causes to the total reported numbers of infant deaths from all causes by individual years and periods, and then compare these ratios. So calculated, I find that the ratio practically has continuously increased, 49.7 per cent. of all recorded infant deaths in 1900 in the registration area having been charged up to these five causes, 59.2 per cent. having been so charged in 1911, and the ratio for the six-year period, 1906–11, having been 57.3 per cent. as against one of 51.4 per cent. for the six-year period, 1900–05. It is possible that quite a number of cases of premature births have latterly been so registered and consequently included among infant deaths though in the earlier years they might have been loosely classified as still-births and not reported at all. In his work on "Infant Mortality and Infants' Milk Depots," Dr. G. F. McCleary, of London, cited facts to show that the registered increase in England and Wales of deaths from premature birth was not entirely explicable by "a transference to the death register of children who would formerly have been buried as still-born," and it is extremely improbable that all, or anything like all, of the apparent increase of the number of deaths in the registration area from premature birth from 10,170 in 1900 to 23,539 in 1911 can be explained away on the theory that improved registration methods have latterly brought about the registration of large numbers of deaths from premature birth which formerly would have figured as still-births.

Certainly any such excuse would scarcely apply to deaths charged to malformations, congenital debility, and injuries at birth, and of course the record of deaths from diarrhea and enteritis stands practically unchallenged. Congenital debility is the only one of the five causes which shows any decline in the ratio of deaths so charged in the later six-year period, all four other causes show a decided increase in the later period, and the ratio of deaths charged to injuries at birth reveals a startling increase of 60 per cent. in the later six-year period as compared with the former six-year period, 2.4 per cent. of infant deaths from all causes having been so listed in 1906–11, although but 1.5 per cent. was thus charged in 1900–05. In the current July number of the *Journal of the Royal Statistical Society* Dr. Reginald Dudfield presents certain figures "On the Increase of Mortality from 'Injury at Birth,'" and shows that 846 deaths were so charged up in the infant mortality statistics for England and Wales for 1910, whereas but 603 were thus entered in 1901, and that for each 100,000 infant deaths in England and Wales in 1906–10 there were 820 due to injury at birth, although in 1901–05 the proportionate number per 100,000 deaths from all causes was but 529. Dr. Dudfield says that "the results are submitted without any discussion of the causes of the increase, as that is a subject more suitable to a medical gathering. It will require some ingenuity to explain away the very great increase in mortality from this one cause—a cause which ought not to be operative except in very rare instances." The proportionate increase in the mortality from this cause in our registration area has not been quite so large as that shown for England and Wales by Dr. Dudfield's figures, but in both the five-year periods named our ratios of deaths from injury at birth to infant deaths from all causes were approximately three times as great as those of England and Wales, there having been 1,630 deaths from this cause in our registration area in 1901–05 as compared with 529 in England and Wales, and 2,257 as compared with 820 in 1906–10. It might seem that this comparison of our figures and the corresponding English figures is almost as surprising as are comparisons of the railroad accident and homicide rates of the two countries, and one which calls for serious attention from our American pediatric societies. I have heard exceedingly competent physicians express, at low breath, the opinion that the latter-day rush of American obstetrical specialists, their unwillingness to wait for nature to take its own course, and their tendency to use chloroform and forceps on the slightest provocation may have considerable to do with the extraordinary apparent increase in our ratio of deaths from injuries at birth. As Dr. Dudfield suggests, however "that is a subject more suitable to a medical gathering."

I have briefly reviewed several phases and fallacies of American infant mortality statistics which impress me as more or less distinctively American, but, aside from our lamentable and unique lack of even approximately complete birth returns, unquestionably the most distinctively American feature of our infant mortality statistics is the enormous population of alien races from all corners of the earth which figures in those statistics and the considerable population of utterly illiterate negroes. Surely no American could be accused of American boastfulness for asserting—or conceding, if you please—that the United States stands absolutely alone among the nations of the world from this viewpoint, and is confronted with an unprecedented conglomeration of problems naturally associated with its mixture of racial stocks. Fourteen years ago Newsholme recorded the fact that "of the 29,002,525 persons enumerated in this country (England and Wales) at the last census 961 per 1,000 were natives of England and Wales," and in 1896 Giddings announced that 979 of each 1,000 inhabitants of London were either natives of that city or other British possessions, only 21 hailing from foreign countries. Russia, Austria-Hungary, and Germany include various racial stocks in their populations—expecially Russia and Austria-Hungary—but their respective percentages of immigrant stock is practically *nil.* In the way of composite, foreign-blooded, population the United States does not now have any rivals, and never has had since the tide of immigration really started, 14.5 per cent., or just about one seventh, of its entire population in 1910 having been foreign-born, and 20.5 per cent. more of its population at that time being of foreign or mixed parentage. It is no easy matter to realize how powerfully this enormous foreign element, with its widely varying birth-rates and infant death-rates, figures in shaping our infant mortality statistics. By way of shedding just a ray or so of light of this phase of the American infant mortality situation, I have appended to this paper certain tabulations showing (1) the foreign-born population and population of foreign or mixed parentage in each of the ten leading cities of the country in 1910, and the ratio of each element to the total population; and (2) the foreign-born populations of each of these ten cities hailing from those exceptionally fertile-stock countries, Russia, Italy, Austria and Hungary, and the percentage ratio of

TABLE I.

TOTAL POPULATIONS, AND POPULATIONS OF FOREIGN BIRTH OR FOREIGN OR MIXED PARENTAGE, OF THE TEN LEADING CITIES OF THE UNITED STATES IN 1910, AS REPORTED IN ABSTRACT OF THE THIRTEENTH CENSUS (p. 95).

Cities.	Total Population in 1910.	White Population.					
		Foreign-Born.		Foreign or Mixed Parentage.		Total Foreign-Born or of Foreign or Mixed Parentage.	
		Number.	Per Cent. of Total.	Number	Per Cent. of Total.	Number.	Per Cent. of Total.
New York.....	4,766,883	1,927,703	40.4	1,820,141	38.2	3,747,844	78.6
Chicago.......	2,185,283	781,217	35.7	912,701	41.8	1,693,918	77.5
Philadelphia...	1,549,008	382,578	24.7	496,785	32.1	879,363	56.8
St. Louis......	687,029	125,706	18.3	246,946	35.9	372,652	54.2
Boston........	670,585	240,722	35.9	257,104	38.3	497,826	74.2
Cleveland.....	560,663	195,703	34.9	223,908	39.9	419,611	74.8
Baltimore.....	558,485	77,043	13.8	134,870	24.1	211,913	37.9
Pittsburgh	533,905	140,436	26.3	191,483	35.9	331,919	62.2
Detroit.......	465,766	156,565	33.6	188,255	40.4	344,820	74.0
Buffalo.......	423,715	118,444	28.0	183,673	43.3	302,117	71.3
Totals......	12,401,322	4,146,117	33.4	4,655,866	37.5	8,801,983	71.0

these combined elements to each city's total population. Summarized in a sentence, the first table shows that about one third (33.4 per cent.) of the entire population of our ten leading cities is foreign-born, that another one third (37.5 per cent.) is of foreign or mixed parentage, and that, all told, 71 per cent., or more than seven out of every ten residents, of our ten leading cities is of distinctively foreign blood. In New York City, 40.4 per cent of the entire population of nearly 5,000,000 in 1910 was foreign-born, whereas in London 63 per cent. of the residents were born in the city, and about 34 per cent. in Great Britain outside of London.

TABLE II.

FOREIGN-BORN POPULATIONS OF THE TEN LEADING CITIES OF THE UNITED STATES IN 1910 RESPECTIVELY ACCREDITED BY THE THIRTEENTH CENSUS TO RUSSIA, ITALY, AUSTRIA AND HUNGARY.

Cities.	Persons Born in				Total Persons Born in These Four Countries.	
	Russia.	Italy.	Austria.	Hungary.	Number.	Per Cent. of Total Population.
New York	484,193	340,770	190,246	76,627	1,091,836	22.9
Chicago	121,786	45,169	132,063	28,938	327,956	15.0
Philadelphia	90,697	45,308	19,860	12,495	168,360	10.9
St. Louis	15,481	7,594	11,171	8,759	43,005	6.3
Boston	41,892	31,380	2,413	426	76,111	11.3
Cleveland	25,477	10,836	42,059	31,503	109,875	19.6
Baltimore	24,803	5,043	6,540	1,358	37,744	6.8
Pittsburgh	26,391	14,120	21,400	6,576	68,487	12.8
Detroit	18,644	5,724	14,160	5,935	44,463	9.5
Buffalo	11,349	11,399	9,284	2,442	34,474	8.1
Totals	860,713	517,343	449,196	175,059	2,002,311	16.1

In default of detailed birth-records for each city there is no known means of ascertaining even approximately how many births and infant deaths in the ten leading cities of this country are to be accredited to the four countries above named from which so large a percentage of the immigrants of recent years have hailed. But in order to show what an important part the populations of Russian, Italian, Austrian and Hungarian birth really play in those ten cities' infant mortality statistics, I have worked out a *purely hypothetical* tabulation showing how many births and infant deaths those elements of the population would have had in each case in 1910 if

TABLE III.

A CONDITIONAL SHOWING OF THE BIRTHS AND DEATHS UNDER 1 YEAR WHICH WOULD HAVE OCCURRED IN 1910, IN THE TEN LEADING CITIES OF THE UNITED STATES, AMONG THE FOREIGN-BORN POPULATION ACCREDITED BY THE THIRTEENTH CENSUS TO RUSSIA, ITALY, AUSTRIA AND HUNGARY, *IF* THE LATEST AVAILABLE BIRTH AND INFANT DEATH-RATES OF THESE COUNTRIES HAD BEEN MAINTAINED (see foot-note).

Cities.	Russian-Born Population.		Italian-Born Population.		Austrian-Born Population.		Hungarian-Born Population.		Total Presumptive Births and Deaths under 1 Year in Population Born in Russia, Italy, Austria and Hungary.						Total Births and Deaths under 1 Year in City.	
									Births.			Deaths under 1 Year.				
	Births.	Deaths under 1 Year.	Births.	Deaths under 1 Year.	Births.	Deaths under 1 Year.	Births.	Deaths under 1 Year.	Number.	Rate per 1,000.	Per Cent. of City's Total.	Number.	Rate per 1000 Births.	Per Cent. of City's Total.	Births.	Deaths under 1 Year.
New York	21,692	5,033	11,211	1,738	6,183	1,268	2,736	531	41,822	38.3	32.4	8,570	205	52.9	129,080	16,215
Chicago	5,456	1,266	1,486	230	4,292	880	1,033	200	12,267	37.4	....	2,576	210	37.6	....	6,844
Philadelphia	4,063	943	1,490	231	645	132	446	87	6,644	39.5	17.2	1,393	210	26.1	38,667	5,334
St. Louis	694	161	250	39	363	74	313	61	1,620	37.7	11.0	335	207	19.8	14,712	1,689
Boston	1,877	435	1,032	160	78	16	15	3	3,002	39.4	17.0	614	205	27.3	17,672	2,252
Cleveland	1,141	265	357	55	1,367	280	1,125	218	3,990	36.3	....	818	205	40.2	....	2,033
Baltimore	1,111	258	166	26	213	44	48	9	1,538	40.7	....	337	219	15.7	....	2,146
Pittsburgh	1,182	274	465	72	696	143	235	46	2,578	37.6	17.1	535	208	24.7	15,059	2,259
Detroit	835	194	188	29	460	94	212	41	1,695	38.1	14.2	358	211	16.7	11,960	2,138
Buffalo	508	118	375	58	302	62	87	17	1,272	36.9	12.7	255	200	15.7	10,008	1,623
Totals	38,559	8,947	17,020	2,638	14,599	2,993	6,250	1,213	76,428	38.2	....	15,791	207	37.1	....	42,533

The latest birth-rates per 1,000 population and death-rates under 1 year per 1,000 living births given for these countries in the Seventy-Third Annual Report of the Registrar-General for England and Wales, published in 1912, are as follows, the year for which each rate is given being stated in brackets: Russia (European), birth-rate (1905), 44.8, infant death-rate (1904) 232; Italy, birth-rate (1910), 32.9, infant death-rate (1909), 155; Austria, birth-rate (1910), 32.5, infant death-rate (1908), 205; Hungary, birth-rate (1910), 35.7, infant death-rate (1910), 194.

their birth-rates and infant death-rates in this country had been identical with those of the countries in which they were born. Citing from *Bulletin 112* of the Bureau of the Census the supposed figures for the total births and total infant deaths in each of our ten leading cities in 1910, I have attached these figures to the hypothetical tabulation of the births and infant deaths of the four foreign-born stocks named, and added the ratio of these hypothetical births and infant deaths to the totals in each case. It must be understood that I have included only the *foreign-born* populations in each case, and *not* included the populations of similar blood either of foreign or mixed parentage, and within these limitations the *purely hypothetical* tabulation shows that 76,428 babies would have been born to these foreign-born residents of our ten leading cities in 1910 if their native birth-rates and infant death-rates had been maintained, and that 15,791 of those 76,428 babies would have died in the first year, thus making a com-

TABLE IV.

TOTAL POPULATIONS, NATIVE WHITE POPULATIONS OF NATIVE PARENTAGE, TOTAL WHITE POPULATIONS, AND NEGRO POPULATIONS, AND RATIOS OF EACH OF THESE GROUPS TO TOTAL POPULATIONS, IN TWELVE LEADING SOUTHERN CITIES IN 1910.

Cities.	Total Population.	White Population.				Negro Population.	
		Native, of Native Parentage.		Total White.			
		Number.	Per Cent. of Total. Pop.	Number.	Per Cent. of Total Pop.	Number.	Per Cent. of Total Pop.
Baltimore	558,485	261,474	46.8	473,387	84.7	84,749	15.2
New Orleans	339,075	147,473	43.5	249,403	73.6	89,262	26.3
Washington	331,069	166,711	50.4	236,128	71.4	94,446	28.5
Louisville	223,928	113,543	50.7	183,390	81.9	40,522	18.1
Atlanta	154,839	91,987	59.4	102,861	66.4	51,902	33.5
Birmingham	132,685	66,312	50.0	80,369	60.6	52,305	39.4
Memphis	131,105	59,985	45.8	76,590	60.0	52,441	40.0
Richmond	127,628	69,130	54.2	80,879	63.4	46,733	36.6
Nashville	110,364	63,687	57.7	73,831	66.9	36,523	33.1
Savannah	65,064	22,634	34.8	31,784	48.8	33,246	51.1
Charleston	58,833	20,458	34.8	27,764	47.2	31,056	52.8
Jacksonville	57,699	22,628	39.2	28,329	49.1	29,293	50.8
Totals	2,290,774	1,106,022	48.2	1,644,715	71.8	642,478	28.0

TABLE V.

A DETAILED SUMMARY FOR THE TWELVE YEARS 1900–11, INCLUSIVE, OF ALL DEATHS UNDER AGE 1 FROM ALL CAUSES IN THE REGISTRATION AREA, AND INFANT DEATHS DUE TO DIARRHEA AND ENTERITIS, MALFORMATIONS, PREMATURE BIRTH, CONGENITAL DEBILITY, AND INJURIES AT BIRTH, AND THEIR AGGREGATE RATIOS TO TOTAL DEATHS UNDER 1 YEAR.

Years.	Total Deaths from all Causes.	Diarrhea and Enteritis.	Malformations.	Premature. Birth.	Congenital Debility.	Injuries at Birth.	Total Deaths from Five Causes Named.	
							Number.	Per Cent.
1900	111,687	27,627	3,227	10,170	13,484	1,050	55,558	49.7
1901	97,477	23,357	3,136	8,615	12,107	1,134	48,349	49.6
1902	98,575	21,912	3,165	9,087	12,724	1,304	48,192	48.9
1903	96,857	22,202	3,677	10,143	12,371	1,669	50,062	51.7
1904	102,880	25,286	4,046	11,361	12,640	1,899	55,232	53.7
1905	105,553	27,455	4,299	11,102	12,515	2,166	57,537	54.5
1906	133,105	35,220	5,857	14,250	15,493	2,543	73,363	55.1
1907	131,110	34,408	6,057	15,245	15,392	2,804	73,906	56.4
1908	136,432	37,049	6,525	16,441	15,833	3,110	78,958	57.9
1909	140,057	36,516	7,286	18,286	14,988	3,508	80,584	57.5
1910	154,373	44,695	7,501	20,275	12,048	3,725	88,244	57.2
1911	149,322	37,579	7,879	23,539	14,895	4,573	88,465	59.2
Totals	1,457,428	373,306	62,655	168,514	164,490	29,485	798,450	54.8
Six-Year Period, 1900–1905	613,029	147,839	21,550	60,478	75,841	9,222	314,930	51.4
Six-Year Period, 1906–1911	844,399	225,467	41,105	108,036	88,649	20,263	483,520	57.3

bined birth-rate of 38.2 and an infant death-rate of 207 per 1,000 living births for these four foreign-born elements in the population of the ten leading American cities. The total birth figures for some of these ten cities as given tentatively for what they are worth in the *Bulletin* of the Bureau of the Census are so palpably defective that it would have been entirely misleading to have worked out the percentage ratio of supposed births of the four foreign-born elements named to the alleged total births of the cities in question. But the infant death returns for those cities presumably are approximately correct, and in that event the infant mortality of the Russian, Italian, Austrian and Hungarian-born population of those cities, as *hypothetically calculated* on the basis of their native rates, would have amounted to more than one third, or 37.1 per cent., of the cities' total infant mortality. That is to say, a population amounting to only 16.1

TABLE VI.

A RECAPITULATION OF ALL DEATHS UNDER 1 YEAR IN THE REGISTRATION AREA IN 1900–11 DUE TO INJURIES AT BIRTH, AND THEIR ANNUAL RATIOS TO ALL DEATHS UNDER 1 YEAR FROM ALL CAUSES.

Years.	Total Deaths under 1 Year from all Causes.	Deaths under 1 Year from Injuries at Birth.	
		Number.	Ratios to Total Deaths under 1 Year.
1900	111,687	1,050	.94
1901	97,477	1,134	1.16
1902	98,575	1,304	1.32
1903	96,857	1,669	1.72
1904	102,880	1,899	1.85
1905	105,553	2,166	2.05
1906	133,105	2,543	1.91
1907	131,110	2,804	2.14
1908	136,432	3,110	2.28
1909	140,057	3,508	2.50
1910	154,373	3,725	2.41
1911	149,322	4,573	3.06
Totals	1,457,428	29,485	2.02
Six-Year Period, 1900–1905	613,029	9,222	1.50
Six-Year Period, 1906–1911	844,399	20,263	2.40

per cent. of the ten cities' total combined population would have supposedly had 37.1 per cent. of the cities' entire infant mortality. And, it might be added, in the case of New York, Philadelphia, St. Louis, Boston, Pittsburgh, Detroit and Buffalo, whose birth returns are fairly complete, the babies which might supposedly have been born to the four foreign-born elements in question would have footed up to 24.7 per cent. of the total births. In a word, roughly speaking, a foreign-born population of less than one sixth of the total population of several of our largest cities might be expected to contribute about one quarter of the total births and more than one third of the aggregate infant mortality. I venture to believe that these tentative figures somewhat graphically show how important a part even the foreign-born Russian, Italian, Austrian and Hungarian elements in our ten leading cities play in American infant mortality.

To the appended tables above summarized I have added one more of a self-explanatory character, namely, a tabulation for the twelve leading distinctively southern cities of their several total populations, native-born white populations of native parentage, total white populations, and total negro populations. In the aggregate these figures show that the twelve foremost southern cities in 1910 had a native white population of native parentage amounting to nearly one half of their entire combined population (48.2 per cent., to be exact about it), a total white population of 71.8 per cent., and a negro population aggregating 28 per cent. of their total combined population. Taking into account the well-known fact of the exceptional negro fertility, the excessive negro infant mortality rate, the 28 per cent. negro population of the twelve principal southern cities, and the final fact that more than one tenth of the entire population of the United States is made up of negroes, the importance of the colored factor, as well as the foreign-blooded alien factor, in this country's infant mortality statistics would seem to be painfully apparent.

THE BACTERIOLOGY OF SOOT*

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The study of soot from a bacteriological standpoint has received but scant attention from the numerous investigators of the problems of the smoke nuisance.

Needless to say the subject has not been left out of the discussions; in fact, it is rather frequently mentioned in a more or less general way. As far as I have been able to ascertain, however, there has been but little definite work on the Bacteriology of Soot as discussed in this paper.

In an article in the *Revue Industrielle* (1), is found the question, "Are we going to learn one of these days that smoke, thanks to its antiseptic properties, contributes to making the atmosphere healthy?" Glinzer (2) refers to the fact that the particles contained in soot possess excellent germicidal and disinfecting qualities. Racine (3) in a discussion on the "Relation of Emphysema and Tuberculosis to coal-lungs in miners," believes from his own observations that anthracosis of the lungs acts as a protective influence against tuberculosis and that the only correct view is that coal has a great disinfecting power and that the conserving action of the coal dust is perhaps to be explained "from its action as a hinderance to the growth of microorganisms such as the bacilli of tuberculosis." We were unable to find in the literature any original work upon which these conclusions could be founded. Percy Frankland (4) shows that fogs do not tend to concentrate or nurture bacteria, for he found there were remarkably few bacteria in London air during a fog. On the other side of the question, Russel (5) includes the increased number of bacteria in a list of contributory causes of the high death rates during fogs. Sir William Ramsay (6) first brought forward the theory that smoke by directly absorbing light, through the action of clouds and fogs, which are particularly fitted to absorb the blue, the violet and ultra-violet rays, which are the germicidal rays in light, contributes to the development and increase of bacteria, pathogenic as well as others, in the atmosphere. Liefmann (7) also believes that under the above conditions "bacteria, especially the pathogenic ones, are permitted to thrive." In passing it may be mentioned that there is no evidence that bacteria ever grow in the air. They are carried into it from a variety of sources, are continually falling out of it by gravitation, being carried out by rains, or destroyed in a number of ways. The effect of the gases in the air upon bacteria is another problem, although it is closely related to the one under discussion. The contamination of the air of our cities with sulphur dioxide is well known (8); also that sulphur dioxide in the air acts as a disinfectant, the necessary proportion being not less than 92 grams of sulphur per cubic meter (9). Cohen and Ruston in "Smoke—A study of town air," have devoted some space to the consideration of the effects of acid rains upon the bacteria of the soil. They point out that the greatest reduction takes place in the numbers and the activity of the nitrifying or nitrate producing bacteria, there being also a marked inhibitory effect on the nitrogen fixing organisms.

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*This research was carried on in conjunction with the "Smoke Investigation" of the Department of Industrial Research, University of Pittsburgh.

In our investigations we examined the air of Pittsburgh to determine the numbers and distribution of bacteria in different parts of the city and to ascertain, if possible, if any relation exist between the bacterial count and the smoke conditions.

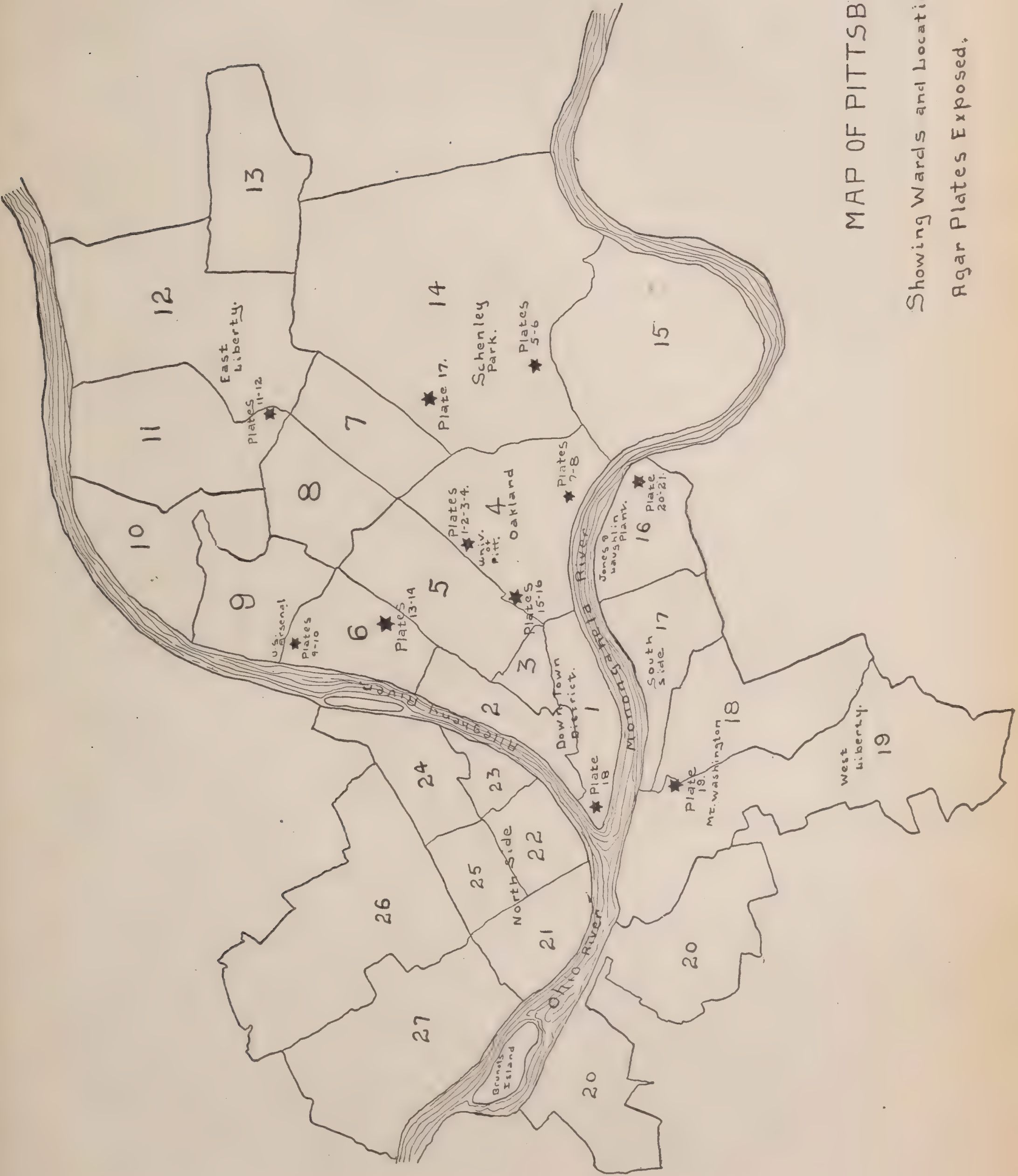
For this purpose twenty glass evaporating dishes seven inches in diameter filled with agar-agar were exposed for from five to fifteen minutes in various districts. Notes were taken of the presence or absence of smoke, the wind direction, the condition of the earth whether moist or dry, and time of exposure. The number of colonies developing in forty-eight hours at 37° C. varied within very wide limits and it was found impossible to discover any influence of the smoke content of the air on the bacterial count. The difficulty of attempting to draw any definite conclusions from these experiments will be patent to everyone, the factors which influence the bacterial content of the air being so numerous and so variable as —rain, moist or dry soil, winds, sunlight, and other conditions. The map of the city shows the points where plates were exposed and Table I gives our findings in a condensed form.

One quite striking observation, however, was made and that was the comparative infrequency of the development of colonies around the soot particles. Rough macroscopic counts were made of the total number of visible soot particles and of those which were infected, as indicated by a black speck in the center of the colony. Out of about 500 counted, 100 showed growth. Many of these particles which we counted as soot, were, in all probability, specks of dust from other sources, so that our proportion of infected soot particles is too high. In several of the plates the soot particles were too numerous to count and around the majority of these no growth was to be noted. This was particularly true in the case of Plates 9 and 10, where the atmosphere was decidedly smoky. Considering the sources from which bacteria enter the air this is not to be wondered at. The smoke as it leaves the chimney is free from bacteria and apparently is not a favorable nidus for their collection from the air into which it is poured.

The common types of aerobic Gram positive spore-bearing bacteria and

TABLE I.

Plate Number See Map.	Time of Exposure in Minutes.	Weather.	Wind.	Smoke.	Count.	Notes.
1	15	Cloudy, rain 3 hrs. before.	N. W.	None	75	B. Coli Communis isolated.
2	15	Cloudy, rain 3 hrs. before.	N. W.	"	53	
3	5	Cool, cloudy; soil damp.	W.	"	15	
4	10	Cool, cloudy; soil damp.	W.	"	68	
5	15	Clear, warm; soil damp.	W.	Blowing towards plates but high.	26	B. Coli Communis. B. Coli Communior.
6	10	Bright sunshine; soil damp.	W.		43	B. Alkaligenes. Fecalis.
7	10	Cloudy, sultry; soil dry.	S.	Blowing towards plates.	51	5 soot particles, no growth.
8	15	Cloudy, sultry; soil dry.	S.		144	15 soot particles, 3 infected.
9	10	Partly cloudy.	S.	Smoky.	60	Soot particles very numerous, 1 infected.
10	15	Warm, dry.	S.	"	108	Soot particles very numerous, 3 infected.
11	5	Clear, warm, sultry; soil dry.	S.	Hanging low.	18	Several soot particles, no growth.
12	15	Clear, warm, sultry; soil dry.	S.	Same.	46	Few soot particles; 1 infected. B. Proteus Vulgaris.
13	10	Bright, hot, dry, sultry.	S.	Valley smoke not dense near plates.	59	No soot particles. Nocardia.
14	15	Threatening rain.	S.		—	Fly contaminated plate.
15	5	Threatening rain; rain 1 hr. before.	E.	Blowing towards plates.	116	B. Pyocyaneus. Soot particles 130; 14 infected.
16	8	Threatening rain; rain began.	E.	Same.	124	Soot particles 174; 17 infected.
17	10	Threatening rain; 2 hrs. before.	E.	Air smoky.	19	No soot particles.
18	10	Hot, clear, dry, dusty.	S. W.	Dirty, dusty, smoky.	196	Soot particles 11; 4 infected.
19	10	Hot, clear, dry, dusty.	S. W.	Valley smoky, clear near plates.	160	Soot particles 19; 11 infected; air nocardia.
20	5	Hot, clear, dry, dusty.	S. W.	Blowing towards plates.	131	Soot particles 72; 30 infected.
21	10	Hot, clear, dry, dusty.	S. W.	Blowing towards plates.	128	Soot particles 56; 14 infected.



MAP OF PITTSBURGH.

Showing Wards and Location of Agar Plates Exposed.

chromogenic organisms were isolated on our plates. B. Coli Communis and Communior, B. Alkaligenes Fecalis, B. Proteus Vulgaris, B. Pyocyaneus, and others, presumably from manure dust, and a few examples of air nocardia were also found.

Our next problem was to determine the action of soot on the growth of bacteria. For this purpose a quantity of soot was obtained from the special chimney in the Department of Industrial Research.

The partial analysis was as follows:

Tar	3.84%
Ash	1.19%
Fixed Carbon	94.97%

This specimen was used throughout the experiments.

The analyses of specimens of soot collected from the air in different parts of the city showed some wide variations.

Woods Run.	
Tar	0.82%
Ash	62.6 %
Fixed Carbon	36.58%
State Hall.	
Tar	0.36%
Ash	66.68%
Fixed Carbon	32.96%

This soot, even after standing around the laboratory in an ordinary cardboard box frequently open to the air, was shown by experiment to be almost free from bacteria. Five agar plates dusted with small quantities of this unsterilized soot failed to show growth with the exception of one colony on one plate. The soot was now added in varying amounts to test tubes of ordinary broth. No growth occurred. However, when larger quantities of this same soot were added to 150 cc. of broth in flasks, growth of bacteria did appear. The organisms developing being of the B. Subtilis group.

Experiments were next undertaken to determine the bactericidal action, suggested by the above observations. Efforts were made to determine any difference in growth in flasks of broth containing soot from other control flasks without soot. Dilution and plating methods were employed but the mechanical interference of the soot particles in the one case ruled out the method as one without even approximate exactness. The counts, however, were uniformly lower in the soot broth than in the control. A series of agar plates, one having the surface sifted with soot, the other free, were next exposed in the laboratory and counts made of the colonies from the aërial contamination. No marked difference in the number of colonies was found.

The following series of experiments have, however, given us quite definite results indicating a very marked bactericidal action of soot. Five grams of soot were thoroughly mixed with 100 cc. of broth 0.6 acid to phenolphthalein. After autoclaving, the mixture was allowed to stand several days. The soot particles were then filtered out and the filtrate after sterilization was seeded with B. Typhosus. A control flask was inoculated at the same time. No growth occurred in the soot-treated broth while a good growth developed in the control.

TABLE II.

Culture.	Soot Broth.	Control.
Staph. Albus	−	+ + +
Staph. Pyog. Aureus	−	+ + +
B. Coli Communis	+ +	+ + +
B. Coli Communior	+ +	+ + +
B. Mucosus Capsulatus	+	+ + +
B. Acidi Lactici	−	+ + +
B. Typhosus (3)	−	+ + +
B. Typhosus (90)	+	+ + +
B. Paratyphosus B	−	+ + +
B. Paratyphosus Achard	+ +	+ + +
B. Dysenteriæ (Flexner)	−	+ + +
B. Pseudodysenteriæ	−	+ + +
B. Iliacus	−	+ + +
B. Proteus Vulgaris	+ + +	+ + +
B. Alkaligenes Fecalis	−	+ + +
V. Cholera	−	+ + +
B. Pyocyaneus	+ + +	+ + +
B. Indicus	+	+ + +
B. Subtilis	−	+ + +
B. Mesentericus	−	+ + +
B. Xerosis	−	+ + +
B. Diphtheriæ (230)	−	+ + +

(The intensity of the growth is indicated by the number of + signs.)

A second experiment was carried out. The broth after treatment with soot as before was tubed and inoculated with a series of organisms. Controls of plain broth from the same batch were used for comparison. Fresh twenty-four hour cultures were employed. The results are seen in Table II.

The soot broth tubes which showed no growth after seeding and incubation, did not show any growth on further transfers with the exception of B. Subtilis. The spores in this case had most probably withstood the action of the bactericidal substance. B. Coli Communior and B. Indicus showed much less growth in the soot-treated broth than in the control. B. Pyocyaneus was apparently unaffected while B. Paratyphosus (Achard) and B. Proteus Vulgaris showed definite agglutionation in the soot-treated broth.

We believed that this inhibitory and bactericidal action was due to the phenols contained in the soot. The soot-treated broth gave a marked reaction for phenols by Millon's reagent while the control broth gave a negative reaction. After testing the acidity, phenolphthalein being used as the indicator, it was found that the soot treated broth gave a difference of 1.7 per cent. acid over the untreated broth, the acidity of which was 0.6 per cent. To determine whether this acidity was the potent inhibitory factor we carried out the following tests.

A new lot of broth was prepared and the reaction made 0.6 per cent. acid. To 500 cc. of this broth 25 grams of soot were added. The mixture was thoroughly shaken, autoclaved and allowed to stand for two days, with repeated shaking and finally filtered. The reaction titrated against N/20 sodium hydrate expressed in terms of hydrochloric acid was found to be 2.2 per cent. acid. One half of the broth was used at this acidity, 2.2 per cent. the other half being reduced to 0.6 per cent. by the addition of sodium hydrate. Half of the untreated control broth had its acidity raised to 2.2 per cent. acid with hydrochloric acid. The four lots were then tubed, sterilized and inoculated with a number of organisms from twenty-four hour agar slants. After an incubation of seventy-two hours, the results obtained were as shown in Table III.

From this it will be seen that we must consider at least two factors in the antiseptic action of the soluble content of soot in broth. The effect of the increased acidity which is seen most markedly in the cultures of the cholera vibrio where practically no growth took place in either of the acid broths is of great importance. The cholera organism is shown to be particularly sensitive to the presence of acid and for its cultivation an alkaline or neutral medium must be employed. Schroeder (10) has shown that the Vibrio choleræ is killed after an exposure of five hours to peat dust. It is especially effective, he says, if the peat dust be of an acid reaction.

The growth of B. Anthracis and B. Subtilis is also inhibited in the broths of high acidity, while B. Alkaligenes Fecalis and B. Iliacus, are definitely affected. It is interesting to note the effect of the acidity in interfering with the production of the coloring matter in the cultures of B. Pyocyaneus. Russel, Cohen and Ruston, and others point out the variable acid content of soot. On the other hand we notice, that, independently of the acidity, the soot-treated broth exercises a marked interference with growth. This is to be seen with B. Indicus, one strain of B. Coli Communis, B. Typhosus, and in B. Paratyphosus to a marked degree. The two latter organisms are not generally affected by small amounts of acid, and are, therefore, valuable in testing out this second bactericidal effect of the soluble parts of the soot.

Soot probably has the power of absorbing many gases from the air especially those associated with the combustion of coal.

The next problem was to study the effect, if any, of soot on the destruction of bacteria in the process of dessication.

TABLE III.

Culture.	Control Broth. 2.2 Acid.	Soot Broth. 2.2 Acid.	Control Broth. 0.6 Acid.	Soot Broth. 0.6 Acid.
B. Indicus......	Heavy cloud.	Trace of cloud.	Heavy cloud, heavy precipitate.	Slight cloud.
B. Pyocyaneus ..	Heavy cloud, powdery scum, trace of green color.	Same, no green color.	Same, bright green on top.	Heavy cloud, thick compact scum, green color throughout.
B. Anthracis....	Clear, no precipitate.	Clear, no precipitate.	Clear, abundant precipitate.	Clear, slight precipitate.
B. Subtilis......	No growth.	No growth.	Heavy ring, heavy precipitate, granular cloud.	Ring on glass, precipitate.
B. Coli Communis (52) and (14)..........	Marked cloud.	Slight cloud.	Marked cloud.	Slight cloud.
B. Coli Communis from urine (780).........	Fair cloud.	Same.	Same.	Same.
B. Typhosus....	Cloud.	Slight cloud.	Heaviest cloud.	Faint cloud.
B. Paratyphosus B............	Marked cloud.	Faint cloud.	Marked cloud.	Faint cloud.
B. Proteus Vulgaris.........	Heavy cloud, no scum.	Heavy cloud, scum.	Very heavy cloud, no scum.	Very heavy cloud, scum.
B. Iliacus.......	Slight cloud.	Fair cloud.	Heaviest cloud.	Heavy cloud and ring.
B. Alkaligenes Fecalis.......	Faint cloud.	Clear.	Marked cloud, scum.	Slight cloud.
V. Cholera......	Clear.	Trace of cloud.	Cloud.	Cloud.

Dessication is one of the most valuable natural means of disinfection and many organisms succumb to its effects very rapidly as the gonococcus, the B. Influenza, the meningococcus and others. The micro-organisms of the air, on our streets, and in our houses are continually being destroyed by this process and we have been able, we believe, to show that soot increases very decidedly, this bactericidal action.

TABLE IV.

Exposure.	Influence of Soot on B. Indicus.		
	Control. Cover Glass. Dipped in Broth and Dried.	Cover Glass I. Dipped in Soot while Moist, then Dried.	Cover Glass II. Dried as in Control. Buried in Soot.
1 day	+	+	+
2 “	+	+	+
3 “	+	+	+
4 “	+	−	+
5 “	+	−	+
7 “	+	−	−
8 “	+	−	+

(The + sign indicates that growth was obtained in the test cultures.)

TABLE V.

Exposure.	Influence of Soot on B. Typhosus and Streptococcus Fecalis.			
	Culture.	Control. Dipped in Broth and Dried.	Cover Glass I. Dipped in Soot while Moist, then Dried.	Cover Glass II Dried as in Control. Buried in Soot.
2 days	B. Typhosus	+	−	
	S. Fecalis	+	+	
3 “	B. Typhosus	+	−	+
	S. Fecalis	−	−	−
	B. Typhosus	+	−	+
	S. Fecalis	+	−	+
4 “	B. Typhosus	+	−	+
	S. Fecalis	−	−	+
5 “	B. Typhosus	+	−	+
	S. Fecalis	+	−	−
6 “	B. Typhosus	+	−	+
	S. Fecalis	−	−	−
9 “	B. Typhosus	+	−	+
	S. Fecalis	−	−	−
10 “	B. Typhosus	+	−	−
	S. Fecalis	+	−	−

The technique of our experiments was as follows: Fresh twenty-four hour-broth cultures of the organisms to be tested were prepared. Small sterile cover glasses were thoroughly moistened by dipping them into the cultures. These were dried under sterile precautions for sixteen to twenty-four hours over caustic soda. They were then transferred to sterile petri dishes and used as controls.

Cover glasses indicated under the heading I in the table, were dipped into the broth cultures and then into sterile soot and finally dried as in the control. Cover glasses under heading II in the table were prepared in the same way and at the same time as the control, and when dry were packed in sterile soot. From time to time these cover glasses were dropped into tubes of dextrose broth to test the viability of the organisms.

It will be noted that the failure of growth is shown very clearly in the case where the moist cover glass was dipped in soot and then dried. In the majority of cases those cover glasses which were first dried and then packed in soot failed to show growth much later than the above, but usually before the control. This is well shown in Table V.

The long period that the Streptococcus Fecalis, 174 days, and Staphylococcus Pyogenes Aureus, 225 days, remained viable under these abnormal conditions, is quite remarkable. (See Table VI.)

In Table VII is shown the peculiar behavior of yeast. It survived longest, 41 days, on the cover glasses dipped in soot while still moist, the conditions under which all the other organisms tested rapidly died out. Marshall (11) quotes Hansen as stating that compressed beer yeast mixed and dried with charcoal kept as long as ten years. The marked resistance of the yeast organism to the action of acids is also of importance in this connection.

The great natural disinfectant of the atmosphere and our surroundings is the bactericidal action of the sun's rays. Direct sunlight is most destructive and its activity upon bacterial life depends directly on the amount of moisture and dust in the air.

Smoke, in contributing very great numbers of minute particles to the air, adds to the conditions favoring fogs and clouds. Smoke, fogs, and clouds, all absorb more or less, the blue, the violet, and ultra-violet rays of the sunlight. This is well seen in the familiar red sun of a smoky atmosphere. These particular rays, which are absorbed, give the important bactericidal action to the sunlight. Most of the above facts have been amply proved by other experiments and it was not considered advisable to repeat them. We have, however, made a few observations on the protective action of soot for bacteria.

The technique of our experiments was briefly as follows: Agar-agar, well seeded with the test organism, was poured into petri dishes. Soot was sifted over one half of the cover of the petri dish while the other half re-

TABLE VI.

Time of Exposure.	Incubation Period.	Influence of Soot on B. Coli, B. Typhi, Streptococcus Fecalis and Staphylococcus Aureus.			
		Culture.	Control. Dipped in Broth and Dried.	Cover Glass I. Dipped in Soot while Moist, then Dried.	Cover Glass II. Dried as in Control. Buried in Soot.
2 days.......	24 hours	B. Coli	+	+	
		B. Typhosus	+	+	
		Strep. Fecalis	+	+	
		Staph. Pyog. Aureus	+	+	
5 "	24 "	B. Coli	+	−	+
		B. Typhosus	+	+	+
		Strep. Fecalis	+	−	+
		Staph. Pyog. Aureus	+	−	+
	48 "	B. Coli	+	+	+
		B. Typhosus	+	+	+
		Strep. Fecalis	+	−	+
		Staph. Pyog. Aureus	+	−	+
6 "	24 "	Strep. Fecalis	+	+	+
		Staph. Pyog. Aureus	+	−	+
7 "	24 "	B. Typhosus	+	−	+
		Strep. Fecalis	+	+	+
19 "	24 "	B. Coli	+	−	+
		B. Typhosus	+	−	−
		Strep. Fecalis	+	−	+
		Staph. Pyog. Aureus	+	−	+
	48 "	B. Voli	+	−	+
		B. Typhosus	+	−	−
		Strep. Fecalis	+	+	+
		Staph. Pyog. Aureus	+	−	+
34 "	24 "	B. Coli	+	−	−
		B. Typhosus	+	−	−
		Strep. Fecalis	+	−	+
		Staph. Pyog. Aureus	+	−	+
	48 "	B. Coli	+	−	−
		B. Typhosus	+	−	+
		Strep. Fecalis	+	−	+
		Staph. Pyog. Aureus	+	−	+

TABLE VI (*Continued*).

Time of Exposure.	Incubation Period.	Influence of Soot on B. Coli, B. Typhi, Streptococcus Fecalis and Staphylococcus Aureus.			
		Culture.	Control. Dipped in Broth and Dried.	Cover Glass I. Dipped in Soot while Moist, then Dried.	Cover Glass II. Dried as in Control. Buried in Soot.
62 days......	24 hours	B. Coli	+	–	–
		B. Typhosus	–	–	–
		Strep. Fecalis	–	–	–
		Staph. Pyog. Aureus	–	–	–
	48 "	B. Coli	+	–	–
		B. Typhosus	–	–	–
		Strep. Fecalis	+	–	+
		Staph. Pyog. Aureus	+	–	+
174 "	24 "	Strep. Fecalis		–	+
		Staph. Pyog. Aureus	–	–	+
225 "	24 "	Staph. Pyog. Aureus	+	–	–
247 "	24 "	Staph. Pyog. Aureus	–	–	–

mained free. These plates were then exposed to the sunlight for definite periods, then incubated and the results read.

A number of plates, seeded with Staphylococcus Aureus, were exposed to sunlight for varying periods every day for two weeks. The results obtained are shown in Table IX. Notwithstanding the irregularity of these results the protection, afforded by the soot in the air and clouds against the action of the sun's rays, is, I believe, clearly shown.

There are a number of very interesting questions which arise as a result of these experiments. It has been shown that soot in contact with bacteria has very decided bactericidal properties. These properties are also demonstrated in the soluble content of the soot. The soot particles from the air as they fell on our plates were generally sterile. This may be due to the solution of the bactericidal substances of the soot by the moisture on our plates, with the consequent destruction of any bacteria adherent to the soot. Or the moisture condensing around the soot as it does in the formation of fogs and clouds, may have acted in the same way before it was collected on our plates. The third possibility is that the majority of the soot particles never came in contact with bacteria after leaving the chimney, at which time they were, of course, bacteria free.

That this disinfectant substance requires moisture in order to have its most powerful effect is well shown in the drying experiments where the organisms treated with soot, while still moist, succumbed very much sooner than the others. There is also the possibility that the soot absorbs moisture from the bacteria and hastens thereby its death by thorough drying. This was suggested in the experiment in which dried organisms were buried in soot and frequently killed off earlier than in the control.

TABLE VII.

Time of Exposure.	Incubation Period.	Influence of Soot on B. Diphtheriæ and Yeast (Saccharomyces).			
		Culture.	Control. Dipped in Broth, then Dried.	Cover Glass I. Dipped in Soot while Moist. Dried.	Cover Glass II. Dried as in Control. Buried in Soot.
3 days......	48 hours	B. Diphtheriæ	+	−	
		Yeast	+	+	
	72 "	B. Diphtheriæ	+	+	
		Yeast	+	+	
7 "	24 "	B. Diphtheriæ	+	−	+
		Yeast	−	−	−
	48 "	B. Diphtheriæ	+	−	+
		Yeast	+	+	+
	72 "	B. Diphtheriæ	+	+	+
		Yeast	+	+	+
16 "	48 "	B. Diphtheriæ	+	−	+
		Yeast	−	+	+
	72 "	B. Diphtheriæ	+	+	+
		Yeast	−	+	+
27 "	72 "	B. Diphtheriæ	+	−	+
		Yeast	−	+	−
38 "	48 "	B. Diphtheriæ	+	−	+
	5 days	B. Diphtheriæ	+	+	+
41 "	48 hours	B. Diphtheriæ	+	−	+
		Yeast	−	+	−
77 "	72 "	B. Diphtheriæ	−	−	−
		Yeast	−	−	−

That the conditions, similar to those of our experiments, are to be found in every smoky city, will be evident to any one who has noticed the black, smeary deposit of soot on damp days where the concentration of soluble

TABLE VIII.

Organism Tested.	Inhibition of Solar Bactericidal Activity.			
	Time of Exposure.	Incubation.	Soot Covered Half.	Unprotected Half.
Strep. Fecalis	5 mins.	24 hrs.	Few colonies	None
	5 "	48 "	Many "	Many colonies
	15 "	48 "	Few "	No growth
	30 "	48 "	Few "	Many colonies
	45 "	48 "	Few "	Many "
	45 "	48 "	Many "	Few "
	120 "	48 "	Many "	Few "
B. Indicus	10 "	48 "	Many "	Many "
Staph. Aureus	10 "	48 "	Many "	Many "
	30 "	48 "	Many "	Many "
	45 "	48 "	Many "	Few "
	75 "	48 "	No "	No "
B. Mesentericus	15	48 "	Few "	Few "
	30 "	48 "	Few "	Few "
	45 "	48 "	Few "	Few "
	60 "	48 "	Few "	Few "
	75 "	48 "	Few "	Few "
	180 "	48 "	Few "	Few "

substances from the soot in crevices and corners must be very high. We have found, as others have demonstrated that the effect of soot in fogs and clouds in diminishing the action of the sun's rays on bacteria, is quite definite. The relative importance of the protective qualities of soot against sunlight to the bactericidal effect of the constituents of soot remains an open question.

There are, therefore, two divergent results brought about by the presence of soot in our atmosphere and upon the earth's surface. One of these is beneficial and the other harmful to the life of vegetable micro-organisms, and from the bacteriological and hygienic point of view may serve as a direct aid in propagating or preventing the spread of infectious disease.

General Conclusions.

1. Soot has a definite bactericidal action on bacteria, due either to the absorption of moisture from the organisms or more probably to the action of its contained germicidal acids and phenols.

2. Soot as it exists in the air does not form a favorable nidus for the collection and distribution of bacteria.

TABLE IX.

(Inhibition of Solar Bactericidal Activity by Smoke. Test Organism Staphylccoccus Pyogenes Aureus)

	Sun.	Clouds.	Smoke.	Result.	Note.
1	Bright		Clouds low.	Killed 1 hr.	
2	Dull.......	Present.	Clouds passing over sun.	Slight difference in 1 hr.	
3	Bright	Passing across sun.	None.	Killed 1 hr.	24 hr. incub.
4	Bright	Same.	"	Lessened in 15 and 30 mins. in proportion.	
5	Hidden, dull	Snowing in morning. Present.	"	Killed in 1½ hrs.	
6	Bright	Thin and white.	Around horizon.	Not killed in 1 hr., lessened.	
7	Clear	—	Haze around horizon.	Same.	
8	Bright and clear	Very few.	—	35 mins., much lessened; 1 hr., almost all killed.	
9	Bright and variable ..	Cloudy.	—	Not killed in 1 hr.	
10	Bright	None.	Much, low down.	Not killed in 1 hr.	Around edge.
11	Dull, foggy.	Foggy.	—	Little change in 1½ hrs.	
12	Dull.......	Many, raining.	Much.	Almost all killed in 1½ hrs.	
13	Variable, free, dull......	Variable.	—	Little change 1¾ hrs.	
14	Bright	None.	Haze.	Killed in 1 hr.	

3. Broth and other fluids treated with soot have conferred upon them a decided germicidal power.

4. This germicidal action is due not only to the acids contained in the soot but also to some other agent, probably some of the phenols.

5. Soot, as it occurs in smoke, clouds, fogs, and as a non-transparent covering for our streets and houses, protects micro-organisms from the destructive action of the sunlight.

I wish to express my thanks to Mr. C. H. Marcy for his valuable assistance in the early part of the work, more especially in the study of the bacteriology of the air of Pittsburgh. I wish also to thank Dr. O. Klotz for many suggestions and Mr. Benner for the samples of soot and the chemical analysis of the same.

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THE HUMANE AND SANITARY DISPOSAL OF SUPERFLUOUS ANIMAL LIFE.

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In all conditions and surroundings of human life, in all countries, and among all men, there is a parallel and intimately connected line of animal life, that in a sense forms a part of the scheme of human existence. The domestic animals are a necessary factor as food for sustaining human life or as beasts of burden to bear a part of the heavy labor, or as our companions or associates in many intimate relations, they contribute in no small degree to our happiness and amusements.

But their span of life is short, and presently they become old and decrepit and finally an incumbrance to be mercifully disposed of.

Besides the smaller animals that pass their whole life as household pets and companions there is a far larger number that for various reasons are separated from or abandoned by their owners or protectors to become a public charge and to lead a precarious existence often attended with great suffering.

In most large cities these hapless victims of men's negligence or cruelty are cared for by the Humane and Benevolent Associations that are supported by voluntary contributions. As a rule the municipal authorities do not concern themselves with this question, except, when absolutely compelled to, they may provide a pound or receiving station where they are held for a short time and then destroyed by the most convenient means.

While the societies endeavor to find comfortable homes for the best animals that come into their possession, still the life of a far larger number must be ended immediately after they are received because of sanitary conditions, or the cost of their care, and often as a merciful termination to a life of suffering.

The methods in use are varied according to the custom or practice of each association. Slow strangulation by illuminating gas or the fumes of charcoal, the administration of active poisons and chloroform or death by shooting are the means commonly used. All these are open to objection, because of the greater or less period of suffering to the animal, or are attended by danger to the health or life of the operator. All leave much to be desired from the sanitary viewpoint, and they are abhorrent to persons of humane and sympathetic feelings.

To discover a method that would overcome these objections, at least to a large degree, and that would be at the same time simple and economical in operation, has been the purpose to which the inventor of the automatic electric cage has given nearly four years of careful thought and study. His invention has taken its present shape as the result of a long series of trials with different forms of apparatus that have been rejected one after another on account of defects that would not stand the tests of experience. From the outset there was no difficulty in destroying animal life humanely by means of electricity. It was quite another matter to construct a machine that would be automatic in action, that could be operated by any fairly intelligent workman, and that would not, on the one hand, put a needless nervous strain on the operator, or, on the other, endanger his safety. After the most exacting tests, involving the humane destruction of many thousands of animals, the inventor now feels confident that this apparatus has reached a final and definite form.

The Animal Rescue League is a Society formed in 1899 for the protection of animals from cruelty, the relief of their suffering, for their care during their life, and for the disposal of their bodies.

It owns and occupies a large home, 51 Carver Street, Boston, just out of Boylston Street at the foot of the Common where the general work of the League is carried on. There are large enclosed yards, many rooms for the various classes of animals and ample space for reception, examination and oversight of the smaller animals, together with the electric cages and crematory for their final ending.

During the past year more than 23,000 cats and kittens, 5,454 dogs, 175 horses, besides birds and rabbits and squirrels have passed through the hands of the League.

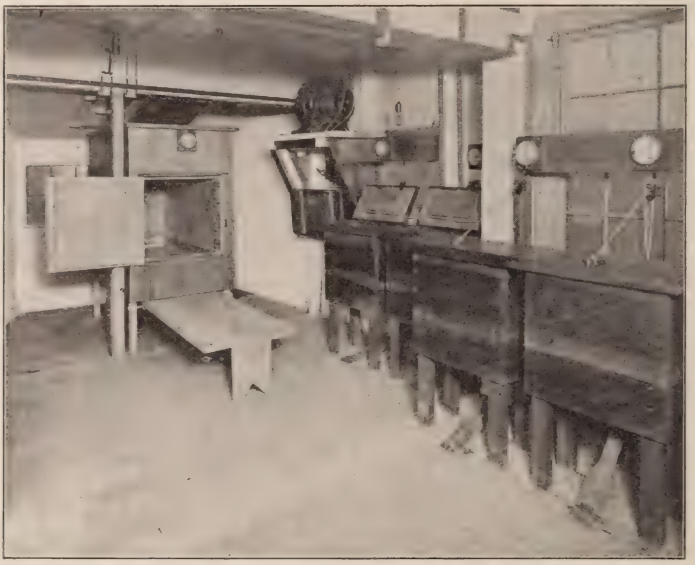
The League owns a country annex and home for horses at Pine Ridge, just outside Boston, and has five branch receiving stations at various points in the city.

For some years past the problem of a satisfactory disposal of the superfluous animals has been one that seriously concerned the board of management, and led ultimately to the adoption of the apparatus now in use.

The electrical plant installed at the headquaters of the Animal Rescue League of Boston consists of one cage for dogs and four cages for cats. It is a plant that can be and is operated readily by one man, who, by this means, can destroy 200 cats or 100 dogs an hour. Two men, working together, can destroy 300 animals an hour, so that even this relatively small plant, if it were operated to its full capacity, would be equal to the demands of any of the largest animal shelters in the world.

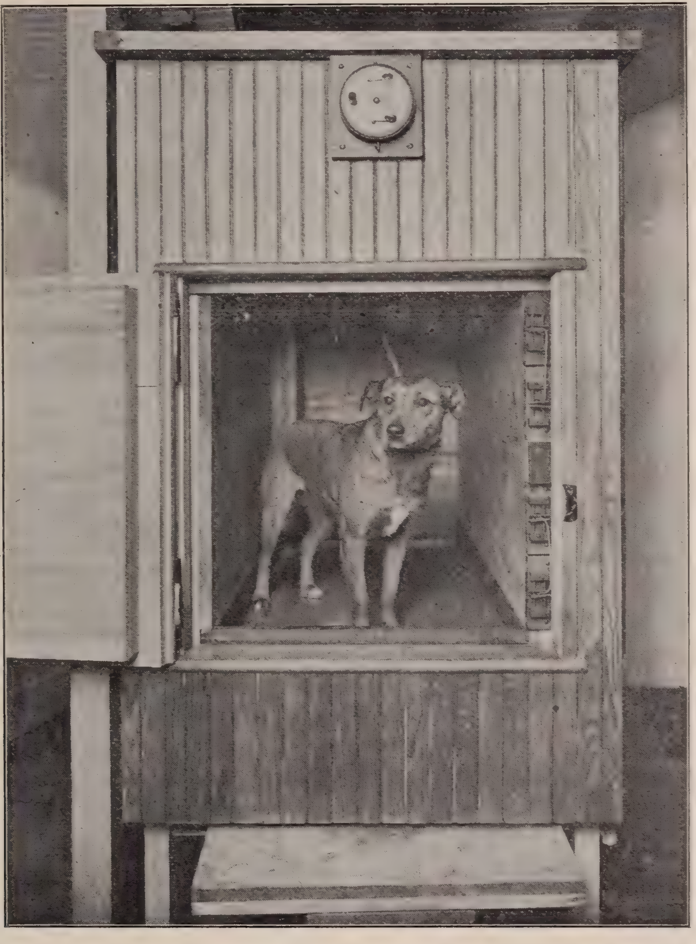
From the first it became evident that on account of radical differences in temperament and disposition as well as of size, dogs and cats would require an entirely different type of apparatus. Dogs are used to wearing collars, and, if they have comparative freedom of movement in a large, well lighted and ventilated cage, they enter and remain in such an enclosure without protest. Cats, on the other hand, do not submit readily to the collar and lead. If they can be placed comfortably in an open box, and lapse to unconsciousness the instant the cover is closed, they can be absolutely destroyed without any preliminary terror; and this is precisely what happens to them when they are put into the automatic electric cages.

A very clear idea of the two different types of cages may be obtained from the illustrations. The dog cage, standing on legs about eighteen inches high, occupies a floor space of two and one half feet wide by five feet long. The cage is large enough to receive any dog up to the largest St. Bernard or mastiff. The top of the cage which is about six feet from the floor, is of glass. A mirror placed over it at an angle of forty-five degrees gives a good view of the interior. The inner cage, which is electrically insulated and so arranged that it cannot be touched by a person outside when the door is closed, has at the bottom a metal pan. From metal bars on either side of the inner cage depend strong spiral springs with snaphooks at the lower ends. One of these bars is connected through one of its metal supports into the secondary electrical circuit. The primary current is controlled by the closing and opening of the door by means of automatic contacts. When the door is open no current can enter the cage. When the door is closed, the current passes to a transformer at the back of the inner cage, and comes to the respective metallic connections at high potential. In operation, a flexible metal collar provided with suitable electrode points



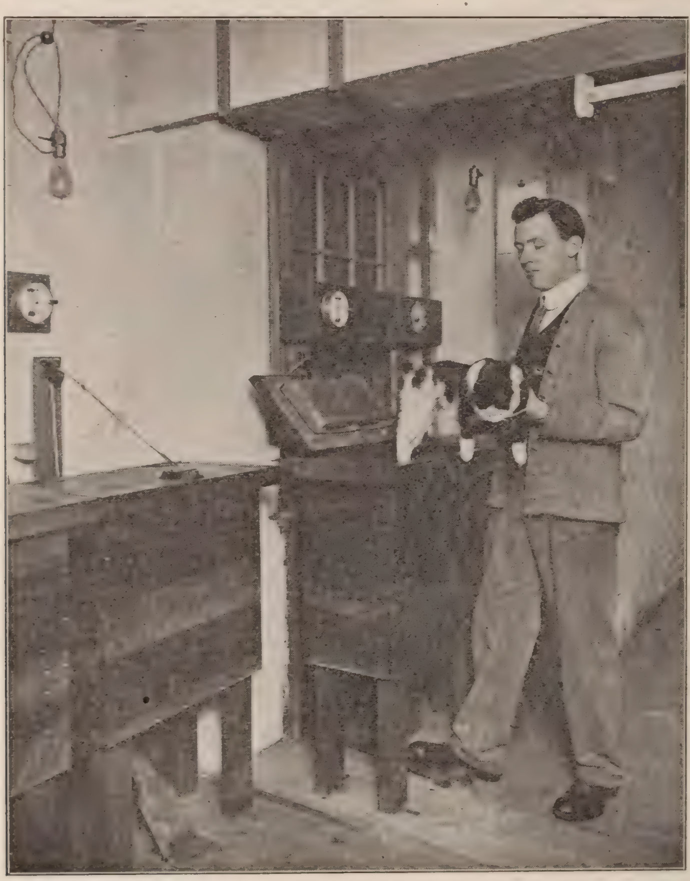
Automatic Electric Cages at the Headquarters of the Animal Rescue League, Boston. Dog Cage on the left; four Cat Cages on the right; reversed rotary for generating current on bracket at right of Dog Cage.

is placed on the dog, the end of a spiral spring is hooked to the collar, and the dog is placed in the cage. The spring slides readily on the metal rod and gives the animal freedom of movement. The instant the door is shut, the animal gets the full force of the shock and lapses at once into unconsciousness.



Dog in Electric Cage. It has freedom of movement and no current is in the cage till the door is closed.

The cat cage, set on legs to bring it to a height convenient for the operator, occupies a floor space of about two feet square. Inside the cage, insulated from the outer box, is a box of slate with moisture-proof joints and having electrodes on the bottom, separated by an intervening space and an insulating strip. The electrodes extend up the ends of the box, and are so arranged that they can be easily lifted for cleaning. As in the dog cage, the primary current is brought to the inside of the outer cat cage, to automatic contacts operated by the closing and opening of the cover. This cover, having an inside projection which falls over and a little within the inside box, is equipped with a cord, pulley, and treadle, so that the operator can lift it by foot pressure, and thus have both hands free to manage the animal. Taking a cat in both hands, he places it in the box in such a way that the two fore feet of the animal are on one electrode and the two hind feet on the other. In this position the cat is perfectly comfortable and has plenty of light and air. The instant the cover is closed, the electric circuit is completed. The primary current goes to the transformer on the inside of the outer cage, and the secondary current, at high potential, returns to the electrodes and passes through the body of the animal.



Electric Cage for Destroying Cats. Operator taking Cat from Cage after it has received the lethal shock.

The time allowed for the destruction of life in the average cat is one minute, or twice the time given to the average dog. The difference may be due to the greater inherent vitality of the cat, to its organic resistance to the electric current, or, what is more probable, to differences in contact, owing to dryness of skin, fineness and density of fur, and so on. This element of time is apparently essential to death by the electric current, and experience would seem to indicate that there would be no material decrease in time if a much higher voltage or greater volume of current were provided. In no case, where measurements have been made, has the amount of electrical energy taken by the animal nearly approached the maximum available.

Interior of Electric Stall. A horse to be killed stands on a metal floor and electric connection is made by the chain hitch to the bridle ring.

One very noteworthy feature of death by the automatic electric cage is the fact that there is absolutely nothing repulsive about it. The bodies come from the cages, relaxed and warm, and so perfectly peaceful in appearance that, if it were not for the widely opened eyes, they would seem asleep. The effect on the operator is very noticeable, especially if he has been used to other and less beneficient methods of slaughter. Instead of the gas chamber, the "shooting gallery" and the chloroform box, with all the accompanying horrors, we have a method of destruction that produces instantaneous unconsciousness, unaccompanied by any preliminary surprise, fear or pain. It comes as near as we can reasonably hope to attain to absolute euthanasia.

As to the cost of this work, where alternating current is commercially available it is so slight as to be almost nominal.

At the League, where it was necessary to install a "reversed rotary" to obtain an alternating current the approximate cost, including the losses of the electrical machinery, figures out less than one fifth of a cent for each animal destroyed, with the d. c. meter rate at ten cents a kilowatt hour. The efficiency of operation is, indeed, a continual source of astonishment to expert electricians and biologists. Those not familiar with electrical matters may be interested to know that the energy taken to kill the average animal is less than one half that required to operate a sixteen candle power lamp, and this only for a minute, or a fraction of a minute.

Equipped with a mechanism similar to that of the Automatic Electric Dog Cage, an electric stall for the humane destruction of horses has been constructed at the Pine Ridge Home of Rest for Horses at Dedham, Mass. The stall has a door at each end and two observation windows. A horse led into the stall stands on a metal plate and is held by a chain hitch to the bridle ring. With approximately the same current and voltage as are used in the dog cage, horses are killed from twelve to ninety seconds, the time apparently varying with the condition of the animal and its susceptibility to electric shock.

The apparatus has been examined and tested by many scientific and professional men and others interested in humane work and has received their unqualied approval. This apparatus is the invention of Mr. Huntington Smith, the managing director of the Animal Rescue League of Boston, Mass.

The Incineration of the Animal Bodies

The final disposition of this large number of animals received annually by the League was another problem that compelled attention. The directors were much in favor of the sanitary and scientific disposal by incineration within the premises if this could be done effectively and economically.

The problem proposed to the engineer called into consultation was to provide a furnace that would cremate an average of 600 to 800 pounds of animals in two hours time, and with a consumption of gas as fuel not to exceed 1,250 cubic feet per hour, without creating smoke or odors that could be regarded as a nuisance in a thickly settled part of the city.

To meet these conditions there was designed by the writer a crematory, or more properly a "destructor," 9 feet in length by 6 feet in width and 5½ feet in heigth placed in the room immediately below the electrical cages. The furnace is built of brick work throughout, the interior of highly refractory fire brick with exterior red brick walls, reinforced and supported by vertical and horizontal steel bands. There is one large charging door and lower door for removing ashes. The interior is divided into two chambers by a tranverse horizontal arched partition of fire-clay moulded brick blocks.

The upper chamber has a capacity for 600 to 800 pounds of bodies for one charge.

The lower and smaller division acts as a primary combustion chamber for the heat derived from three large specially designed gas burners placed at the rear end. These burners are connected to a header and this with a pipe line from the street main and meter, with valves for controlling the volume and a small motor and air compresser supply the air pressure to the burners.

Between the upper chamber and the chimney flue is a series of chequer work perforated fire brick partition walls which becomes highly heated and completes the combustion of the smoke and inflammable gases before they are allowed passage to the chimney.

The operation is conducted by first raising the temperature of the upper chamber and connecting brick work to 1,250 degrees and at once placing the charge through the side door upon the fire brick grates. The heat is then raised to the necessary destroying temperature, 1,500 to 1,900 degrees, and continued until the cremation is half completed, when the burners are then gradually cut off and the final incineration is by the contained and radiated heat of the interior.

The furnace went into use in October, 1910, and in the succeeding fifteen months destroyed upwards of 100 tons of animals with an expenditure of gas averaging from 2,500 to 2,800 cubic feet per day.

The rate of combustion and amount of gas required varies with the calorific values of the material consumed depending mainly upon the quantity of fatty matter contained. For instance one charge of 800 pounds was consumed using only half the power of one burner and in another case the gas was used only one half the usual time. In 6 months, February 1 to August 1, 1912, there was burned 110,300 pounds in 456 hours with 321,000 feet of gas.

This gives a gas consumption per pound of material burned of 2.91 cubic feet and the rate of combustion at 4.39 pounds per minute. The average of seven runs was 1,400 pounds burned at the rate of 3.69 pounds per minute with a gas consumption of 2.35 feet per pound of material destroyed.

In the ten months since the permanent plant was installed there have been destroyed 25,000 animal bodies in daily continuous use with no repairs and in an entirely sanitary and satisfactory manner.

All of the apparatus of electric cages is contained in a room 15 feet long and 8 feet wide. The destructor, motor and air compressor occupies about the same space on the floor below.

Taken as a whole this equipment for terminating the life of animals and the destruction of their bodies is the most sanitary, efficient and humane method in use in this country for providing for the disposal of useless animals.

It is decidedly worth the attention not only of managers of Humane Societies but of municipalities, where the problem, at least on its sanitary side is closely connected with the welfare of every civilized community.

HEALTH DEPARTMENT REPORTS AND NOTES.

TO STATE AND MUNICIPAL HEALTH OFFICERS.

This new division of the Journal is specially designed to be of use to active Health Officers of the countries represented in the American Public Health Association. It will be unable to serve its true function unless the Health Officers are willing to coöperate by sending to the Journal copies of their reports, bulletins, new ordinances and personal information which will be of general interest. Furthermore it would be distinctly desirable if communications on subjects of general interest are submitted for publication in this division of the Journal. The management will further welcome any suggestions from Health Officers for the improvement of this division. All communications should be addressed to Selskar M. Gunn, Managing Editor, American Journal of Public Health, 755 Boylston St., Boston, Mass.

REPORTS.

Clinton, Massachusetts.

The Board of Health of Clinton presents its report for the year ending January 31, 1913. The death-rate for the year 1912 was 14.53, the highest since 1910, a condition perhaps due to increase in population and the fact that the rate is based on the 1910 census. The birth-rate is not given. The report would be improved by the introduction of the international system of classification of deaths.

The work of the board is carried on by nine agents, which it appoints at salaries ranging from $200 to $900 per year, only two being over $500.

The report of work accomplished indicates that the various employees are doing thorough work and using up-to-date methods. Contagious diseases have been well taken care of and a threatened epidemic of smallpox was promptly headed off by a wholesale vaccination in which 6,000 vaccine points were used. An epidemic of measles attacked the city in December, 555 cases being reported in a single month.

Work along various popular lines of sanitation have been undertaken, including crusades against tuberculosis, the roller-towel, flies and mosquitoes. A city clean-up day has been inaugurated. The score-card system of dairy inspection is used and the scores are published with beneficial results.

North Yakima, Washington.

Dr. Thomas Tetreau, health officer of North Yakima, presents his report for 1912 in the annual report of the city. North Yakima has an estimated population of 16,500 and this report is the first since the adoption of the commission form of government. The Health Department believes in publicity and issues a monthly bulletin as well as additional educational pamphlets. It might be advisable to issue the yearly report as one number of the monthly bulletin, but it certainly does not suffer from comparison with the reports of the other departments and adds to the appearance of progress which the rest of the book presents.

The annual cost per capita of the Health Department is $1.20, or $1.33 if the work of meat inspection is included. The death-rate for 1912 was 9.15 per thousand and the birth-rate 18.4. The mortality of infants under two years of age is 89 per thousand births. The international classification of deaths is used and is tabulated by months and ages. No deaths are reported from measles, scarlet fever, or whooping-cough, and the total from contagious diseases, including diarrhœa and enteritis, is thirty-six, of which twenty were due to tuberculosis of the lungs. The food inspector, bacteriologist and city nurse (who serves as superintendent of Associated Charities) are all women but present a record of work accomplished which many men in these positions fail to equal.

The whole report tells plainly of enterprise and hard work and the only improvement to be suggested is that it should be expanded and added to by reports of work other than the tables to which it is limited in its present form.

Pueblo, Colorado.

The annual statement of the city controller of Pueblo for 1912 contains a brief tabular report of the work of the board of health during that year. The expenditure for health work is about twenty-three cents per capita per annum. The death-rate is not given but appears to be 10.97 per thousand. The tables are inadequate and poorly chosen and classified throughout. For example, in the tabular statement of the causes of death, instead of using the Bertillon classification, a confused system is found, including modes as well as causes of death, overlapping and incomplete terms, and, incidentally, 15 per cent. of all terms used are misspelled. It is not even arranged alphabetically and gives no division of totals into age groups and monthly periods. Stillbirths are included among the deaths.

Scranton, Pennsylvania.

The annual report of the Bureau of Health of Scranton, Pa., for the year 1912 is fairly representative of the work that can be accomplished by an underpaid, undermanned Health Department. Its forty-eight pages epitomize rather than expand upon the work of the year. Obviously the report is designed to supply the layman with the conventional, routine information collected in the local office. With a population (estimated) of 134,500, the death-rate is 14 per thousand or .78 less than in 1911, and the birth-rate is 28.7 (exclusive of premature births which shortly proved fatal). Associated with the low death-rate is a death-rate from tuberculosis of 80.2 per 100,000 inhabitants, and 11.1 for typhoid, while for diarrhœa and enteritis under two years of age it was 145.7, and for violence 113.9. (The latter two rates are exclusive of non-resident deaths.)

The Bureau of Health is under the Department of Public Safety. The staff consists of the superintendent, a secretary, a bacteriologist and his assistant, a food inspector, an inspector of dairies and watersheds, a plumbing inspector, a fumigating officer and two sanitary officers. By no means full time is expected of all these men. Consequently the extent of the work reported by the food inspector, inspector of dairies and watersheds, bacteriologist, plumbing inspector and the summary of the sanitary work for the year is all the more creditable. Whether the city does not get more than it pays for with its totally insufficient appropriation of $11,000, or nine cents per capita, is somewhat of a question. The urgent request for another inspector of meats and other foods, and a plumbing inspector deserves an attentive ear, but far more important and valuable than these would be the establishment, as the superintendent, Doctor Keller, urges, of a hospital for the isolation and treatment of contagious diseases. Scranton, the center of a population of over 500,000, within a comparatively short radius, has no such hospital.

A welcome addition to this report is the publication of tables containing the number of deaths and the rate per 100,000 of the more common contagious diseases, cancer, violence and the birth and death-rates, since the year 1879. Splendid decreases are noticeable even in recent years in typhoid and scarlet fever. In connection with these tables, as with most of the others, one serious criticism must be made. Non-resident deaths are not included. Nor is it always entirely clear in other tables whether they are included or not. A similar criticism is called forth by the exclusion from the total births and the total deaths of premature births resulting in death. While the state law requiring death certificates on premature births after four months gestation seems severe, as long as other cities include premature births among their deaths, and since the Census Bureau at Washington includes them, this further raising of the death-rate should be courageously faced by Scranton.

As in most cities the weakest link in the sanitary chain is infant mortality. As yet the work along this line has been without marked results, although each year has seen some improvement in the milk supply. The work of voluntary organizations has been sporadic.

The unusually high death-rate from violence, 113.9 per 100,000, finds some explanation in the dangers of the coal mines, one-third of the above deaths occurring from that source. More obscurely, we imagine, lies the explanation of the death-rate from burns which is so peculiarly high.

While the 1912 report makes no mention of it, it will be remembered that Scranton was one of the first cities to enjoy a preliminary survey by the Russell-Sage Foundation. The effect of this survey of last spring will be watched with interest and in the 1913 report will find, we trust, full consideration.

Williamsport, Pennsylvania.

Williamsport, a city of 35,000 population, claims to spend only fifteen cents per capita per annum for its board of health, which employs nine agents in its work. No tabulated financial statement is presented in the report.

An alphabetical system is used for the classification of deaths, which is about as satisfactory as this method ever is, but the total deaths and the death-rate ("about 13 per thousand, deducting stillbirths and accidents") are found only after diligent search in another section of the report. The chief cause of death, it is interesting to note, is pneumonia with a record of seventy for the year. Contagious diseases appear to be well controlled with the exception of measles which has a record of 531 cases in three months. The tabular record of contagious disease might better be condensed from the five pages which it now occupies to a single page.

Regular medical inspection of schools has proved of value in raising the general sanitary condition of the city. Dairies are inspected and graded by an arbitrary system without reference to any score card, two thirds being placed in the first class which includes all those where conditions are good for the production of wholesome milk. The number of nuisances has been reduced by having a general cleaning by the street department during the month of May, with free removal of refuse.

The Newburgh Suivey.

The report of the limited investigations of social conditions in Newburgh, New York, has recently been issued by the Department of Surveys and Exhibits of the Russell Sage Foundation. It contains 104 pages bound in paper cover and may be obtained from the office of the Foundation at 128 East Twenty-Second Street, New York City, for fifteen cents per copy. It is illustrated with numerous half-tone engravings of scenes in

Newburgh and with reproductions of display charts which graphically point out present conditions and how they may be improved.

The report comprises investigations of public schools, public health, housing, delinquency, public library, recreation, charities, industrial conditions and municipal administration. While all of these reports are well prepared and instructive those on "Housing" by Miss Amy Woods, on "Industrial Conditions" by Edward F. Brown and Zenas L. Potter, and on "Public Health" by Franz Schneider, Jr., will be of particular interest to the readers of this magazine.

Mr. Schneider's article on public health is excellent and should be read by all who are interested in municipal health work since it has been prepared with a view to general improvement in conditions which may apply to any city even though it is directed at Newburgh, which appears to present a fertile field for the introduction of such improvement. The most modern methods in use over the country are put forward as models and while the article is unfortunately limited in extent it might serve as a text-book or, at least be of great value as a reference work for many health officers.

At the time of the survey Newburgh was a city of 31,242 inhabitants, but spending less than twelve cents per capita for their health. The control of health work was entrusted to a board of seven members, which employs a health officer who devotes only one hour a day to the work. In this time he does creditable work, but recognizes the fact that little constructive activity is possible under such an arrangement. As might be expected modern methods and lines of activity are almost wholly lacking. Sanitary supervision of the city's water supply, food supply, and housing conditions are lacking. Communicable diseases are inadequately controlled as a result of lack of facilities for laboratory diagnosis and hospitalization, and the absence of medical inspection of schools. As a result of all these conditions vital statistics are deficient, the typhoid rate is high, infant mortality is above normal and general sanitary conditions are in a disgusting if not a positively dangerous condition.

Mr. Schneider closes with the following summary of recommendations for improving upon the opportunity offered by the natural health assets of the city:

"The situation calls for a thorough-going re-organization. A full-time health officer, endowed with proper authority and responsibility, is indicated; and additional assistance in the form of nurses or inspectors should be provided to permit of new and important work in tuberculosis, infant hygiene, the control of communicable diseases, and various sanitary inspections—such as of housing, privy vaults, and the like. The milk, water, and food supplies—now neglected, should receive reasonable supervision, both from the standpoint of inspection and of laboratory examination. A health department clinic and dispensary, which should be of great help in eliminating unrecognized and neglected sources of infection in the city, and in the health department's work against infant mortality and communicable diseases, is also earnestly suggested. Finally, a thorough investigation of the typhoid situation should certainly be instituted. These steps, if taken, should materially increase the efficiency of the present work and secure to the city an up-to-date and reasonably complete health program.

"It must be emphasized that these recommendations embody the minimum requirements for a progressive city, and it is fortunate that to secure them, and so place Newburgh among the more thoroughly civilized cities of her class, will require the expenditure but of a few thousand dollars. The statement is now freely made by authorities that, within limits, public health is purchasable. The opportunity to buy now confronts Newburgh in practically its entirety."

DEPARTMENT NOTES.

Low Temperature Pasteurization.

In order to determine the best way of pasteurizing milk so as to kill the disease germs and yet not give the milk a cooked flavor or lesson its nutritive value, the Department of Agriculture, through its dairy division, has been conducting a series of experiments, treating milk at different temperatures and for different lengths of time. According to the report on these experiments in *Bulletin 166 of the Bureau of Animal Industry*, when milk is pasteurized at 145° F. for thirty minutes the chemical changes are so slight that it is unlikely that the protein (muscle-building element) or the phosphates of lime and magnesia are rendered less digestible than they are in raw milk.

Moreover, from a bacteriological standpoint, pasteurizing at low temperatures is found to be more satisfactory than pasteurizing at high temperatures. According to *Bulletin 126* and *Bulletin 161*, where low temperatures are used, the majority of bacteria that survive are lactic acid organisms which play an important part in the normal souring of milk. When milk is efficiently pasteurized at high temperatures the bacteria which survive are largely of the putrefactive kinds, and milk so treated if kept for any length of time has a tendency to rot instead of sour. From the standpoint of economy, the technologist of the dairy division finds that pasteurizing at low temperatures calls for less heat. It is found that it takes about 23½ per cent. less heat to raise milk to the temperature of 145° F. than to a temperature of 165° F. A similar gain is a saving of the ice needed, because it will require 23½ per cent. more refrigeration to cool milk to the shipping point when it is pasteurized at the higher temperature. The department, therefore, recommends that, "When market milk is pasteurized it should be heated to about 145° F., and held at that temperature for thirty minutes."

Schoolroom Health Officers.

The committee on janitor service of the National Education Association's Department of Science Instruction has recently published a summary of its recommendations. The report points out the fact that janitors are often as well or better paid than school teachers but are usually not prepared or tested before appointment and are especially lacking in a knowledge of sanitation. Therefore, it is urged that, in order to get facts preparatory to the standardization and improvement of janitor service, the coöperation of the students be enlisted.

It is suggested that in a room the children be appointed health officers with a length of service such that each child has a period of service at least once a year. If found advisable credit may be given for this in physiology, hygiene, or biology. The observations which can be made will vary with the age of the children and range from hourly reading and plotting of temperatures, humidity and air currents to determinations of dust and bacteria in the air and photometric determination of illumination from windows. The results of these observations may be charted on the blackboard or reports may be made to teacher or principal who alone are allowed to "interfere with the janitor."

Wherever possible the pupil is expected to regulate abnormal conditions as in the case of heating devices, ventilators, open windows and humidifiers. In elementary grades the children may assist in keeping the room free from dust by wiping surfaces with a clean, preferably moist, cloth. Health officers should report the sweeping of rooms or corridors while in use by pupils or teachers and the cleanliness of washbowls, water-closets and windows. It will often be found advisable to introduce health officers from the older grades into rooms where the children are too young to do the necsssary work.

The plans suggested will probably meet with opposition from the school teacher who pictures the distraction of attention consequent on having a classmate rushing about reading thermometers, whirling psychrometers and aspirating air through a tube of sugar, but the novelty will soon wear off and there is little doubt but that a student health officer is a much greater benefit to his classmates than a "monitor of the gold-fish bowl."

New French Method of Garbage Collection.

"Paris has long fought against the method of garbage collection used in that city. The carts are of an old type; they are slow; much of the refuse collected falls back into the streets; the odors are unpleasant, and the hours of collection inconvenient. A new system is about to be installed, in which all these disadvantages are remedied. The new wagons are electric vehicles. Forty-one are to be put in commission immediately, and will make three trips each between the hours of 6 p. m. and 7 a. m., after which hours it is expected there will be no garbage cans on the sidewalks. This will enable the flushing of the streets to be carried on after the collection of the garbage and not during it, as now."

The American City, September, 1913.

Milk Infection from Return Cases of Scarlet Fever.

"The association of milk infection with return cases of scarlet fever has not been hitherto recorded, and the following outbreak, which was reported to the Glasgow committee on health by Dr. A. K. Chalmers M. O. H., affords evidence of the care which should be exercised with patients discharged from hospital when discharge from the eyes or nose is present. The outbreak occurred in November last.

"Twelve cases in all occurred, affecting eleven households. An interval of sixteen and thirteen days respectively separated the two earlier cases from the others, the dates of sickening being November 2, 5, 18, 23, and 26 (one case each), November 20 (three cases), and November 21 (four cases).

"All the employees at the dairy, of which these families were customers, were medically examined without furnishing a history or showing any symptoms suggesting scarlet fever, but when the farm from which the milk supply of the dairy was obtained was visited, and the members of the household examined, it was found that two of the farmer's children had been dismissed from one of the county fever hospitals, one on October 26, and another on November 16, and that the former was suffering from an acrid nasal discharge, so frequently associated with return cases of the disease, while the latter bore evidence of having recently had a similar discharge. Doctor Chalmers writes:

" 'It has long been recognized that children dismissed from hospital apparently recovered from these complications are liable to recurrence thereof, and thereby occasionally to transmit infection to other members of the family on their return home, but there is no case recorded hitherto, I believe, where milk would appear to have become the carrier of infection thus acquired, and the explanation in the present instance would appear to be that the mother attended to the child with the discharge, and was also engaged in milking.' The children were at once removed from the farm, the premises disinfected, and no further cases occurred."

The Medical Officer, October 18, 1913.

Anti-Typhoid Vaccination for Children.

"The use of anti-typhoid vaccination among children has as yet received little attention, perhaps because we do not ordinarily think of typhoid fever as a disease of childhood. Yet, according to no less an authority than Osler, this is a disease of youth and early adult life. Out of 1,500 cases treated in the Johns Hopkins Hospital, 231 were under fifteen years of age, and 255 were between the ages of fifteen and twenty.

"In a recent issue of the *Journal of the American Medical Association*, Major Russell of the Army Medical Corps discusses the inoculation of 359 children, between the ages of two and sixteen years who have been vaccinated by fifty different physicians in many parts of the United States. No harmful effects have been reported in any of the 359 children and, so far as known, none has contracted typhoid fever, although some of the vaccinations were made over three years ago. Major Russell regards it as a particularly valuable method in the case of children and young people leaving home for summer vacations, school, college, etc.

"The importance of checking typhoid among the young is shown by the fact that in the registration area of the United States there were in 1909, the last year for which complete mortality statistics are available, a total of 3,366 deaths from typhoid fever in patients under twenty years of age, out of a total of 10,722 of all ages, or almost one-third of all deaths from the disease. They were distributed according to ages as follows: under two years, 97; under three years, 139; under four years, 132; under five years, 110; five to nine years, 647; ten to nineteen years, 2,174. A very large proportion of these deaths could, without question, be prevented by the more frequent use of anti-typhoid vaccine,"

The Survey, August 30, 1913.

Troglodyte Sailors.

"Dr. Herbert Williams, medical officer of health for the Port of London, has again drawn attention to the fact that the conditions under which seamen live on board vessels are extremely favourable to the spread of infection and the development of disease. He continues: 'The occupants of the seamen's quarters on board many ships may be described as "troglodytes," for indeed many of these places are very similar to caves, constructed of air-tight materials, dark, overcrowded in a hygienic sense, and ventilated (?) by an iron pipe which is generally blocked up, thus only allowing the fresh air to enter by the door.' He quotes the following example, which was met with during last year, as indicating the possible danger which may arise from persons on board suffering from pulmonary tuberculosis: 'The chief baker on a steamer carrying a number of passengers was working on board the ship from April 29, 1912, until November 2, 1912, when he was found to be suffering from pulmonary tuberculosis and was put off duty.' Doctor Williams thinks that comment on this case is needless—the objection, if not the danger, must be realized by everyone."

The Medical Officer, August 2, 1913.

"Missed" Cases.

"The mildest cases of either diphtheria or scarlet fever are as dangerous for well children to be associated with as are those of the most malignant type, and the most dangerous of all is what is called the unrecognized case of either of the diseases mentioned. It is well known that from the mildest cases of either diphtheria or scarlet fever the most malignant form may be, and often is, contracted. Many times people will insist upon the early termination of quarantine for the reason, as they put it, 'The child was hardly sick at all.' For the same reason, too, they will think that the disease 'could not be catching.' This is a a serious mistake, as the child with a light attack is just as dangerous, as a means of spreading the contagion, as is the child that has the disease in its worst form.

"Here is a case that illustrates what we are trying to make clear: A young married man with a wife and little child complained of not feeling well for nearly two weeks, but despite this fact continued at his work. At the end of this time his wife was taken with scarlet fever in its worst form and a few days later, after her removal to the hospital, the baby was stricken with the same disease. Within ten days after their admission to the hospital both the mother and baby died. An examination of the husband, made at the time his wife was taken sick, showed that he had had scarlet fever in a mild form and was still suffering from it. The only trouble was that it was so mild that it was not recognized as being scarlet fever, but it cost him the lives of his entire family. Mild cases spread more contagion than do the severe ones."

Press Service of Chicago, Department of Health, September, 1913.

Control of Vice.

John Haynes Holmes of the Church of the Messiah, New York City, suggests in an article in *The Survey* of September 27, the following measures which shall serve as what he terms "a flank attack on vice":

"1. Adopt the 'Little Tin Plate' ordinance, already enacted at Portland, Ore., and now pending before the aldermen in New York, which provides for the posting of the name and address of the owner of a building on a conspicuous part of his property. Houses of prostitution will be few and far between when the name of the owner is lifted as high as Haman for the passerby to read.

"2. Enact a law, making it impossible for the owner of a house of prostitution to collect insurance upon his property. I am informed—I know not how accurately—that such a measure is in force in Wyoming, with excellent results.

"3. Enact a law, providing that the property in a house of prostitution, like the paraphernalia in a gambling house, shall be subject to public confiscation, and may be destroyed on order from the court.

"4. Enact a law, empowering a board of health, either state or local, after due investigation, to declare a house of prostitution a place of contagious disease, and to order the same closed and abandoned. This is one of the excellent suggestions of the Chicago Vice Commission.

"5. Enact a law, declaring a house of prostitution to be a public nuisance, and empowering any citizen to institute summary proceedings for the abolition of the nuisance.

"6. Provide at municipal expense, decent forms of amusement to supplant low dance-halls, theaters, etc., which now debase the morals of the people for private profit. This was one of the original recommendations of the New York Committee of Fifteen.

"7. Above all, by one sweeping attack around the enemy's flank upon his base of supplies, guarantee to every working girl an ample living wage, short hours, and decent conditions of labor."

Milk and Cats.

"The question of sanitation in the home may be studied from many sides. We often find causes of diseases where we least expect to. In any case of contagious disease, the Health Department endeavors to find the true cause of such disease and thereby prevent further infection. In many instances, it is next to impossible to get the least clue as to what caused the disease in the first place.

"One condition which may be the cause of contagion is the contamination of milk bottles by cats and dogs. Usually, a small quantity of milk is left on the top of the cap on the bottle. This is consumed by the wandering feline as a rare delicacy. Cats are known to be very susceptible to diphtheria and, consequently, may easily carry the germs of that disease and, no doubt, may be looked upon with suspicion when no other cause of the disease can be discovered.

"The public, to protect itself, should give the matter consideration. Milk bottles, when left by the milkman, should be placed in such manner that they are out of reach of cats or dogs. This can easily be done by providing a shelf, or still better, a box-like compartment which keeps it both safe and cool until taken into the house.

"Many modern houses have these milk receiving compartments built into the wall. However, if they are not supplied in the house you occupy, they can readily be provided. Any reasonably well made box will serve the purpose. It is advisable to have this box placed in a cool and sheltered spot during the summer time; in a reasonably warm spot during the winter months. Milk always deteriorates under the sun's rays and heat and equally deteriorates if frozen. So both conditions should be guarded against as well as the contamination that may result from cats, dogs or other animals' contact."

The Milwaukee Healthologist, September, 1913.

Ozone.

"The use of ozone for purposes of bacterial destruction has been advocated in the sterilization of water, the purification of the air in rooms and the control of infections in general. At the time of testing the methods for the purification of water to be used in the public schools of Buffalo it was found that devices relying upon ozone as the purifying agent were not successful. Recently, Jordan & Carlson, and also Sawyer, Beckwith and Skolfield have published their results, which confirm the opinions of Hill, Flack, Konrich, Schwarz and others, that ozone generated in rooms by electrical devices produces an irritation of the respiratory tract without being of any value as a bactericide in the air. They condemn its use in schools, offices and other places where persons are confined, and claim in addition that faulty ventilation cannot be detected.

"For these reasons the use of ozone either for water purifying or the attempt of room disinfection does not seem applicable."

Buffalo Sanitary Bulletin, September 30, 1913.

Swat the Cockroach.

"Among the household pests that are the bane of all good housewives, the cockroach ranks along with mosquitoes and the much dreaded bedbug. If anything tends to destroy the good temper and peace of mind of the cleanly and order-loving housewife, it is to have her kitchen swarming with cockroaches. Until recently, however, the cockroach has not been thought of as a possible carrier of disease. But in the light of experiments conducted in the laboratory of parisitology in the University of California, it appears that if the house fly carries the germs of disease, the cockroach is scarcely less dangerous in the same way and transmits bacteria in a similar manner; that is, by collecting the germ-laden filth on its feet and mouth parts and by feeding on filth and discharging this when feeding on human food. It is shown that the cockroach invades places where contaminating material, such as sputum or excrement, is found and that its food habits are such as to afford ample opportunity for its contaminating the food of man."

Chicago Department of Health, *Press Service*, October, 1913.

Public Health in North Carolina.

"Last Monday at the regular session of the Board of County Commissioners, Orange County made an appropriation of $250 for the purpose of coöperating with the State Board of Health in establishing a public health and hookworm campaign in that country. Randolph and Davidson counties recently made similar appropriations for the same purpose. This makes ninety-nine of the one hundred counties in North Carolina that have shown a sincere interest in the welfare of their people. Human lives and human suffering have appealed to the comsioners of these counties above dollars and cents. The value of good citizenship has been rated above live stock, in contradistinction to the custom existing in North Carolina in the days gone by. This is a most remarkable situation in the health work of our state. But for the failure of the Ashe County board to take favorable action it could have been reported that every county in North Carolina is interested in its health conditions, and had coöperated with the State Board of Health, and provided funds to better the health and sanitary conditions of its people.

"No other state in the Union has reported such a marvelous awakening of its people, and it is to be hoped that at the next meeting of the Board of Commissioners of Ashe County they will reconsider their decision and thus make the counties of North Carolina unanimous in their action and attention to health and sanitary matters.

"Dr. C. L. Pridgen of the Hookworm Commission of the State Board of Health is hoping to report before long that an active health campaign has been conducted in every county in the state. This will give North Carolina her usual place as the first of all the states of the Union to accomplish this."

N. C. State Board of Health, *Press Service*, September 15, 1913.

Cream Grading.

"At a meeting of the board of health of the Department of Health, held August 26, 1913, the following resolution was adopted:

"Resolved, That the following rules and regulations relating to the sale of cream in the City of New York be and the same are hereby adopted to take effect November 1, 1913:

1. *Grade A Cream.*

(a) Grade A Cream (Raw).

"Definition—Grade A Cream (Raw) is cream made from either Grade A Guaranteed Milk, Grade A Certified Milk or Grade A Inspected Milk (Raw).

"1. The cream shall be delivered to the consumer within 48 hours after milking.

"2. The cream shall not contain more than an average of 100,000 bacteria per c.c. when delivered to the consumer or at any time prior thereto.

(b) Grade A Cream (Pasteurized).

"Definition—Grade A Cream (Pasteurized) is cream which is made from any raw milk conforming to the requirements of Grade A, and which has been pasteurized.

"1. The pasteurization of cream shall take place within 36 hours after the process of separation.

"2. No cream shall be pasteurized more than once.

"3. The cream shall be delivered to the consumer within 36 hours after the completion of the process of pasteurization.

"4. The cream shall not contain more than an average of 100,000 bacteria per c.c. when delivered to the consumer or at any time after pasteurization and prior to such delivery.

"5. All containers in which pasteurized cream is delivered to the consumer shall be plainly labeled Pasteurized. Labels must also bear the date and hours between which pasteurization was performed, the place of pasteurization, and the name of the person, firm or corporation performing the pasteurization.

General Regulations for Grade A Cream.

"1. Unless otherwise specified in the permit, the cream shall be delivered to the consumer only in bottles.

"2. The caps of all bottles containing Grade A Cream shall be white and shall bear the term Grade A in black letters of large type, and the words of the subdivision to which the cream in the said bottle shall conform.

2. *Grade B Cream.*

(a) Grade B Cream (Raw).

"Definition—Grade B Cream (Raw) is cream which is made from Grade B Selected Milk (Raw).

"1. The cream shall not contain an excessive number of bacteria when delivered to the consumer or at any time prior thereto.

(b) Grade B Cream (Pasteurized).

"Definition—Grade B Cream (Pasteurized) is cream which is made from pasteurized milk or from Grade B raw milk and pasteurized.

"1. No cream shall be pasteurized more than once.

"2. No cream containing an excessive number of bacteria shall be pasteurized

"3. The cream shall not contain an excessive number of bacteria when delivered to the consumer or at any time after pasteurization and prior to such delivery.

"4. All containers in which pasteurized cream is delivered to the consumer shall be plainly labeled Pasteurized, and shall give the name of the person, firm or corporation performing the pasteurization.

General Regulations for Grade B Cream.

"1. Caps of bottles containing Grade B cream shall be white and marked "Grade B" in bright green letters, in large type, together with the words of the subdivision to which the quality of the cream in the said bottles conforms.

"2. Cans containing Grade B Cream shall have a tag affixed to each can with the term Grade B in large type, and the words of the subdivision to which the quality of the cream in the said can conforms."

Weekly Bulletin of the New York City Department of Health, September 13, 1913.

Health Bulletin Ethics.

"We feel highly complimented because the Kansas City, Mo, Health Department reproduced a greater portion of our May *Bulletin* in their last issue, much of which was original matter, but sorry to call their attention to the fact that they have not extended us the courtesy of giving credit to its source of production. This is a matter that should be given more careful consideration, and, as Dr. St. Clair Drake, editor of the *Chicago Health Bulletin* put it, a very serious deficiency of many of our American health bulletin editors, and has led Chicago and others to copyright their bulletin issues against this violation of ethics and wholesale thievery. None of us have any objection to the reproduction of any of our bulletin matter, if proper credit be given."

Bulletin of the Nebraska City Department of Health, June, 1913.

"Canned" Health Lectures.

"Here is one way in which the State Board of Health can help you in your school, church. and community work. We have just secured two sets of lantern slides, with lectures already written out to accompany them. One of the lectures is on tuberculosis and is well adapted for any mixed audience, while the other lecture is on the general subject of health, the teeth, voice, hearing, and sight. It is especially adapted for schools, and for work on the medical inspection of school children.

"Any one can 'deliver' or read one of these stock lectures while some one else operates the slides in any ordinary stereopticon lantern.

"The State Board of Health offers to loan these slides and lectures free of charge to any school, church, club, organization, or public-spirited citizen who will agree to give a lecture from them provided they pay the express charges to their town. Then they may hold the slides and lecture until we send them an order requesting that they be shipped to some one else.

"Besides the slides and lectures, this board will also send you special bulletins to help you get posted on the subject on which you expect to lecture, and a limited quantity of various kinds of public health leaflets which may be distributed among the audience after the lecture.

"Here is a golden opportunity for any one at all interested in giving his club, church, or community an entertaining and instructive lecture. And if the lecturer wants to add more religion to his lecture, let him draw lessons from the life of the Great Physician, or let him teach modern sanitation from the Book of Deuteronomy.

"Doctors usually make excellent people to deliver such lectures. However, on account of the delicacy of medical ethics and on account of the difficulty in getting a good audience to an ordinary lecture, doctors thus far have not, as a rule, volunteered to give health lectures as freely as they might. But if some church, school, or public-spirited citizen will invite a doctor to give one of these illustrated lectures there will be little danger of his not accepting the invitation. Try it once.

"To secure these slides and lectures, write the State Board of Health, Raleigh. Do not announce the date for a lecture until you find out when you can get the slides."

N. C. State Board of Health Bulletin, September, 1913.

Milk Bottles and Typhoid.

"When a case of typhoid fever occurs in Asheville, the dairyman delivering milk to the afflicted family is immediately notified of the fact. That is usually enough to make the dairyman feel that to some extent his dairy is charged up with the case, until it is proven that no further cases occur on his route or that the first case was due to something else.

"Furthermore, the dairyman is not allowed to remove milk bottles from the premises of the sick person until the bottles have been sterilized by the health department. This is a very wise provision, because typhoid germs grow very rapidly in milk, and if the milk bottle should become accidentally contaminated with typhoid germs in the typhoid-stricken home the dairyman might contaminate his other bottles and cans in the course of ordinary washing and spread the disease to the rest of his customers. This is a very good precaution. What is the policy of your town in this matter?"

N. C. State Board of Health Bulletin, September, 1913.

PUBLIC HEALTH NOTES.

Campaign against Anti-Vaccinationists.

"On the bill-boards of a suburb of Berlin there was recently posted a large placard with the title Vaccination, Disease, Death, which made a propaganda against vaccination and finally recommended the procuring of a pamphlet which had the title, 'How Shall I Conduct Myself with Reference to the Demand for Vaccination?' The committee against quackery of the Berlin Aerztekammer (Medical Chamber) sent a communication to the communal authorities in which attention was directed to the very objectionable contents of the placard, and especially to the fact that by this placard and the pamphlet advertised in it the public was directly incited to disobedience to an imperial law. The communal authorities were requested to take action for removing the placard from the public placard columns. The town council immediately complied with this request and in a public statement asserted that the entire placard was suited to produce false ideas in the public mind."

Berlin Letter, Journal of the A. M. A., August 16, 1913.

Chicago's Clay-Hole Proposition for Garbage Disposal.

"Forced by foolish, bickering procrastination to dump the garbage of Chicago in clay holes because of the expiration of the contract with the Chicago Reduction Company on September 30, and because no preparations had been made to take over the service, Chicago presents a sorry spectacle of inefficient business management, all the more noticeable because of the very size of the problem.

"Three appraisers, Col. Henry A. Allen, for the city; Mr. Harold Almert, for the reduction company, and Mr. Leonard Metcalf, selected by the two first-mentioned appraisers, failed to make a unanimous appraisal principally because Colonel Allen did not consider 'going value' as an asset. His figure was $208,582, while that of the other two engineers was $492,500. The city refused to accept anything but a unanimous report, and when the time expired the reduction company quit taking garbage, with the result that since September 30 no collections have been made. At this season 600 tons per day are collected. On October 6 the City Council passed an ordinance renting a 32-acre clay hole, now used for rubbish dumping, instead of buying it, as authorized at a meeting October 1. A temporary handling plant is being thrown together and from experiments conducted by Dr. George B. Young, health commissioner, it is believed the garbage can be disposed of in a safe and inoffensive manner by giving it chemical treatment and subsequently covering it with rubbish. Only the sight will be filled by this method in a year and could then be converted into a park. Dr. Young estimates that the plant will cost $30,000; material for use up to January 1, $15,000; labor, $15,000, and incidentals, $15,000. The city has been paying the reduction company less than $50,000 per year.

"During the same council meeting at which the clay-hole proposition was put through the offer of the Chicago Reduction Company to sell its plant for $383,000 (more than $100,000 less than was asked a week previous) was rejected. Dr. J. M. Hirsh offered to pay the city 10 cents per ton for the garbage and have a plant ready in thirty days. His proposition was referred to the finance committee."

Engineering Record. October 11, 1913.

Would Use Discarded Battleships for Sanatoria.

"Rather than continue the present practice of 'scrapping' or using as targets discarded battleships and cruisers, Dr. S. Adolphus Knopf of New York, suggests in a resolution adopted by the Fourth International Congress on School Hygiene, that these vessels be used as sanatoria for tuberculosis patients. Dr. Knopf would have the government turn over to whatever states could use them, any useless vessels, which may be adapted for sanatoria, open air schools, etc. He argues that while the cost of remodelling these ships would in some cases involve considerable expense, the necessary repairs would not cost as much as the erection of a sanatorium of equal capacity, and besides, in most cases, the difficulties in finding a suitable site would be obviated. In justice to those states, which by reason of their location, cannot make use of discarded battleships, Dr. Knopf suggests that a nominal sum should be paid for these vessels by the states which use them, this money in turn to be divided proportionately among the inland states for the establishment and equipment of open air schools, preventoria, sanatoria, or hospitals for consumptives. By such a policy, the greatest possible good for the greatest number of American citizens afflicted with tuberculosis will be attained. Dr. Knopf's ideas suggest the plan proposed by the Southwestern Tuberculosis Conference for the use of the federal government of abandoned forts in the Southwest for tuberculosis sanatoria. The political and constitutional objections raised against this plan at Washington seemed to be insuperable. The full text of the resolution as unanimously adopted by the International Congress on School Hygiene follows:

"*Whereas,* Nearly a million tuberculous children, or children strongly predisposed to tuberculosis, are attending our public schools, and there is hardly accommodation for 1,500 to receive instruction in the open air; and

"*Whereas,* The Congress is convinced that the open air school is one of the most powerful agents in the prevention and cure of tuberculosis in childhood, and it has been furthermore demonstrated that nearly all climatic conditions, providing the air is dust-free, lend themselves to the prevention of tuberculosis in the predisposed and the cure of the afflicted; and

"*Whereas,* Statistics show that there are not nearly enough hospital and sanatorium accommodations for adults and children afflicted with pulmonary tuberculosis or children suffering with tuberculosis joint or bone diseases; and

"*Whereas,* It has been demonstrated in New York and other cities that discarded vessels lend themselves admirably to transformation into all-year-around hospitals and sanatoria for consumptive adults, sanatoria for children afflicted with joint and other types of tuberculosis, and into open air schools for tuberculosis, anaemic, and nervous children;

"*Resolved,* That the Fourth International Congress on School Hygiene petition the United States government to place at the disposal of the various States of the Union as many of the discarded battleships and cruisers as possible, to be anchored according to their size in rivers or at the seashore and to be utilized by the respective communities for open air schools, preventoria, sanatorium schools for children, or hospital-sanatoria for adults. Be it further

"*Resolved,* That the Congress expresses its appreciation to the Italian government of the example it has given by consecrating three of its discarded men of war to the combat of tuberculosis. Be it further

"*Resolved,* That this Congress expresses the sincere wish that other governments may follow the example of Italy; and be it finally

"*Resolved,* That copies of these resolutions be presented to the American and other governments represented at this Congress."

Journal of the Outdoor Life. October, 1913.

Paper Milk Vessels.

"The hygiene advantages of papier mache milk vessels are strongly urged in a note by Mr. James S. Dunn, chief sanitary inspector for Kimberley, contributed to the 'Official Municipal Year Book of South Africa.' Mr. Dunn writes: 'Paper bottles have everything in their favour. They are filled at the farm while the milk is fresh and before contamination from the many extraneous sources. They are only used once and never refilled. Each purchaser is, therefore, assured of an original bottle of clean, wholesome milk providing all the precautions, applicable to the proper production of milk have been compiled with. The dealer also profits. He pays freight on the original carriage only and is relieved from the necessity of returning the empties.' Mr. Dunn adds that the collection of bottles, return freight on the empties, breakage, and bottles lost through various reasons, constitute a big item, while the cost of new paper bottles is very small in comparison."

The Medical Officer. October 4, 1913.

Public Health in Alaska.

"In the 60,000 square miles of Alaska there were in 1910 about 65,000 inhabitants, a little over one to the square mile. A sanitary survey of this population has just been completed by Dr. Krulish of the Federal Public Health Service, who traveled some 7,000 miles in Alaska during the course of his inquiries.

"Few Americans realize the size and importance of the Alaskan peninsula and its wonderful resources as yet undeveloped. Of the 65,000 population, 25,000, are natives (including Indians and Esquimaux) and only 36,000 are full-blooded whites.

"The white people of Alaska are on the whole healthy, and they give rather little attention to the administration of health laws, apparently because they are too well to bother about it, and because they believe in the 'superlative healthfulness' of the climate. The native population, however, are afflicted with many ailments, which are chiefly the result of their unhygienic living and the lack of facilities for the treatment and isolation of the infected. Tuberculosis, eye affections, and venereal diseases are the most important. The native population had decreased 14 per cent. between 1900 and 1910. About 15 per cent. of the native persons examined had tuberculosis—few of these in an active stage.

"The average native home has but one room, and the sanitary arrangements are primitive in the extreme. On the seacoast, garbage and rubbish are thrown into the sea; while in settlements located on rivers, they are thrown into the rivers. During the winter months all refuse is allowed to accumulate, and in the spring, if the village school-teacher can force the natives to bestir themselves, it is cleaned up and somehow disposed of. Says Dr. Krulish: 'It is in the crowded, unventilated homes, where all eat out of the same dish, drink from the same teapot spout, use the same towel, and expectorate on the floor, that the principal danger of contagion exists and that tuberculosis and trachoma are most frequently contracted.'

"The Federal Government, which has the territory of Alaska under its control, has endeavored to improve health conditions through the United States Public Health Service, and also by enlisting the aid of the school-teachers. They have been reporting monthly, births and deaths, although at present these reports extend to less than a third of the native population. The school-teacher is also called upon to initiate many local improvements.

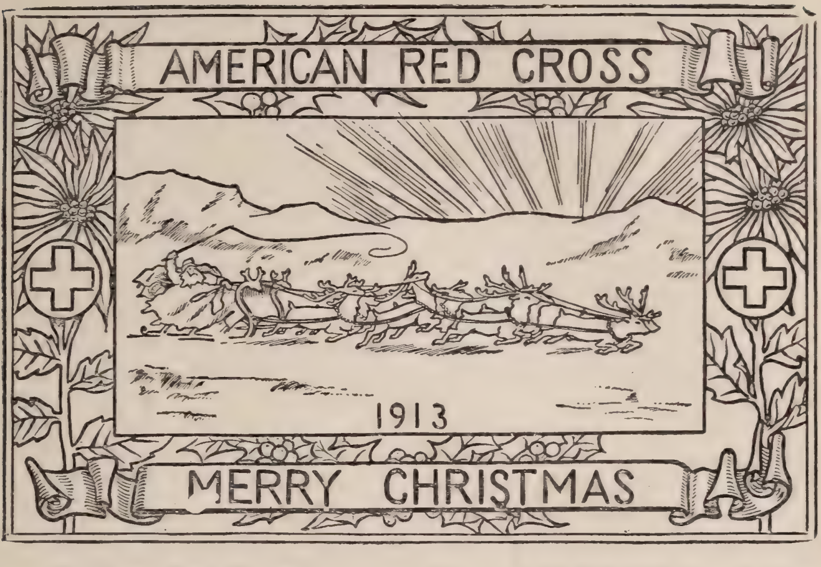
"As the result of a survey of the towns and villages of Alaska, facts were gathered showing the existing health ordinances. All towns provided for the appointment of a health officer, for the disposal of garbage and sewage, the abatement of nuisances, and the isolation of contagious diseases; but, on the other hand, there is no community in Alaska which has an ordinance relating to the disposal of bodies, or for the destruction of flies, or for compulsory vaccination. How long will Alaska continue to depend only upon its climate?"

Medical Review of Reviews. August 19, 1913.

An Index of Refinement.

"True civilization and refinement in a town, community, or individual family can be judged very closely by the way they handle their own filth. If they have the antiquated open, insanitary privies, or no privies at all, and no screen doors or windows, they are about at the bottom of the scale. If they have screen doors and windows, they have moved up quite a bit; and if they have abolished privies altogether, or use sanitary privies and screens at their doors, they have passed the selfish stage and recognize that they are their brother's keeper. Where are you on this scale?

North Carolina State Board of Health Bulletin. September, 1913.



Red Cross Seals in 1913.

Running night and day, the presses of the American Bank Note Company are turning out for the American Red Cross and the National Association for the Study and Prevention of Tuberculosis, 100,000,000 Red Cross Christmas seals for use in the coming holiday campaign. If every one were sold for a penny, a million dollars would be realized for the anti-tuberculosis campaign in various parts of the country.

But, even the most enthusiastic of those on the firing line hardly expect more than one-half of these little bullets to be appropriated. Over 40,000,000 or $400,000 worth of seals were sold in 1912, however, a gain of nearly twenty-five per cent. over the previous year. Because of the growing interest in the anti-tuberculosis movement it is hoped that the 50,000,000 mark will be reached this year, netting $500,000 for the prevention of consumption.

A radical departure from previous seals in the shape and character of the design has been instituted this year. The seal is rectangular in shape, one and one-half inches wide and one inch deep. The center of the design will depict Santa Claus with his eight reindeer dashing across a field of snow, and the border will be a brilliant red and green decoration, the Red Cross emblem appearing on either side. The accompanying illustration shows the seal in black and white.

The design was drawn by C. J. Budd of New York, the well-known illustrator, who was awarded a prize of $100 for his drawing. The second prize $50 was awarded to R. Foster Worthley of New York and the third to Miss Hazel de Berard of Brooklyn. Miss Sara B. Hill of New York was given honorable mention.

Distribution of the seals will be started about October 1, and by December 1 it is expected that the entire 100,000,000 will be distributed. If more are needed, an additional supply will be printed. In addition to the seals themselves, advertising material to the amount of several million pieces is also being prepared. A particularly striking piece of advertising will be a small blotter for use as an envelope enclosure. The campaign this year will be organized in almost every city and town of the United States, and no less than 100,000 agents will give their services to the work.

Visiting Nursing.

"At the recent meeting of the National Organization for Public Health Nursing, held at Atlantic City, Miss Lillian Wald had the following to say regarding visiting nursing and its relation to the public: "We like best to feel that visiting nursing is no longer associated in the mind of the intelligent public with only the pauper. It has emerged as a service for those who are sick in their homes and who are not to be classed with those entirely dependent on bounty, but whose incomes do not permit the engagement at full pay of the private nurse, or, for that matter, whose incomes do not permit the payment of the full cost of the bed in the hospital. It has been estimated that ninety per cent. of sick people are sick at home, and the visiting nurse associations have been for some years eager to identify their service with all classes of people who are sick at home, excepting those with incomes ample enough to engage the private nurse. It is said that less than twenty per cent. of the people in the United States have incomes of more than $1,000. The margin for sickness is necessarily too small to enable them to have complete care without resource to subsidized hospitals or subsidized nursing service. Because of the insufficient incomes of a large percentage of families where there is sickness, it is inevitable that means must be devised for giving them nursing care without injury to individual independence. Perhaps the only possible method for obtaining this is taxation. . . . It will probably be a long time before America responds to the social pressure for any form of state insurance that will include nursing for the sick. Until such time, people of very small or of moderate means can be cared for without any impairment of their dignity through their insurance, and perhaps in this way receive it."

International Hospital Record. August 20, 1913.

The Cost of Sickness.

"Preventable diseases today causes huge economic losses under two general groupings. Through illness they keep expert workers at home, thereby robbing them and the world of a part of their product. By death they cut short the careers of many persons who are in their economic prime. Think what the adding of but five years to the lives of men who now die at 45, 50 or 55 would mean in additional service and economic outputs—five more years of productive activity without the loss and waste involved in shifting their burdens to workers new and untrained. The present financial loss in this country through untimely deaths is only partly indicated by the five hundred million dollars paid out in death claims, etc., every year on life insurance policies. Dr. Allan J. McLaughlin of the United States Public Health Service recently stated in an address before the Association of Life Insurance Presidents, that in the matter of typhoid fever alone the number of preventable cases each year in the United States would probably reach 175,000 and that the deaths therefrom that could be avoided would total 16,200. He estimated the economic loss from this one disease at not less than one hundred million dollars annually. The report of the National Conservation Commission on National Vitality states that the economic waste from preventable deaths every year in the United States is about one billion dollars and that the economic waste from preventable illness is five hundred million dollars every year—making a total annual economic loss of one and one-half billion dollars, or more than enough to pay the entire expense of the Federal government."

Bulletin of the Ashveille, North Carolina Health Department, August 1913.

The Cost of Health.

"Every one has been interested in the wonderful work being done in Panama in the construction of the canal. Startling as have been the results of the work of the engineers and builders, the work of the Sanitary Department has been even more wonderful. In a region noted as the most unhealthful in the world, in which our predecessors, the French, were unable to succeed because they could not keep the workers alive, American Army surgeons, by the use of scientific facts known to all, have succeeded in lowering the death-rate among American residents far below that of our most favored American communities. According to Colonel Gorgas, the chief sanitary officer of the Canal Zone, the death-rate for 1911 among 10,489 Americans was only 4.48 per thousand. While this result has been mainly due to the control of yellow fever and malaria, and while it is true that the American population consisted of picked individuals, largely of educated men and women in the prime of life, yet even with all these conditions recognized, the record is a remarkable one, and is probably without a rival. And all this, says Colonel Gorgas, has been accomplished at an expense averaging one cent per day for each individual. If this result can be secured at this cost in the center of a tropical jungle, what would not a similar expenditure do for our American cities? . . ."

Journal A. M. A.

Coöperative Public Health Work.

"Hon. F. W. Matthiessen, millionaire philanthropist, has again come to the fore in the tri-cities of La Salle, Peru and Oglesby, and submitted a proposition to the city councils of those cities which will be of untold benefit to every man, woman and child therein, enabling them to enjoy every protection from disease known to modern science. The acceptance of Mr. Matthiessen's proposition will place the Tri-Cities in the lead of any other community in the state so far as health and sanitation is concerned.

"Mr. Matthiessen's plan is that the Tri-Cities organize a health bureau with a health commissioner in general charge thereof, to embrace the cities of La Salle, Peru and Oglesby. In doing this there will be prevented a great deal of physical and mental suffering, which in the end will reduce taxes, as it is a well known fact that disease and death represent a high cost to any community.

"It is also provided that the health commissioner shall also conduct and maintain a department of research in public health matters for the advancement of hygiene and the prevention of disease. The position of health commissioner is to be absolutely nonpolitical and such officer to be appointed by Mr. Matthiessen, and also asks that the city councils pledge their coöperation in carrying out this plan and that the health commissioner have full power to act under the ordinances which shall be passed by the three cities to make the health bureau effective.

"All of the expense connected with the establishment, operation and maintenance of this health bureau will be paid for by Mr. Matthiessen, but each city is to furnish to the health commissioner a sanitary inspector, detailed from the police department of each city, with full power and authority to carry out the orders of the health commissioner, the salary of this sanitary policeman to be paid for by the municipality.

"Oglesby has already accepted Mr. Matthiessen's magnanimous offer and La Salle and Peru will follow suit.

"It is probable that Dr. Ruediger, the present state health officer of North Dakota, will be appointed health commissioner."

Free Trader, Ottawa, Ill. November 5, 1913.

Trachoma.

"Investigations into the prevalence of trachoma have established the interesting fact that this disease is a veritable scourge among the Indians. The Public Health Service has demonstrated that 22.7 per cent. of 39,231 Indians examined were suffering from trachoma. The condition was most prevalent in Indian boarding schools, less in Indian day schools and least among reservation Indians above and below school age. It is obvious that the general ignorance of domestic hygiene, the occupation of one-room huts in place of the open tepees are factors in lessening the general health of the aboriginal American. With a lack of personal privacy, the common use of towels, wash basins, and bedding, and the general neglect of all measures of personal hygiene, the dissemination of trachoma is exceedingly simple.

"Dr. J. A. Stucky has awakened public interest in the trachomatous state of American mountaineers in eastern Kentucky. His pioneer work in establishing a clinic under difficult conditions served to arouse the interest of the Kentucky Board of Health and the United States Bureau of Public

Health. His general investigation of underlying conditions reveals a sad need of modern hygienic methods. The once vigorous natives, locked in their mountain homes, all but starving on their scanty crops, inadequately shod and clothed, dwell amidst open sewers, sharing with one another bed clothing, towels and disease. While Dr. Stucky has called attention to the trachoma problem and two trachoma clinics have been installed, the medical problem has scarcely been attacked. Here again is evident the value of social medicine.

"The lessons of sanitation, hygiene, dietetics, and modern medicine are called for. Homes must be visited, social workers are required to arouse discouraged souls and physicians must rally to the call for help. It is obvious that all attempts to lessen the spread of trachoma must be based upon an alteration of the present physical environment. The mere removal of tonsils and adenoids or the operative procedures called for by trachomatous sequelae will not suffice to prevent the further spread of this fearful disease of the eye."

Journal of Surgery. November, 1913.

Sanitation at Gettysburg.

The following brief account of some of the sanitary measures in force at the Veterans' Reunion at Gettysburg is clipped from an article in the *American Journal of Clinical Medicine* for September, 1913:

"The toilet accommodations consisted of 90 latrines, with two urine-troughs each; the total seating capacity of these being 3476. These latrines consisted of board walls, with flat, tarred-paper roofs, with ample air space between the roof and the side walls.

"Two pits were dug in each enclosure to a depth of 6 feet, where the ground water permitted. They were about 20 feet long and about 4 feet wide. The seats were arranged in two rows, and were of the box form, with hinged lids.

"Each morning, latrine-squads visited the latrines. The box-covers were tilted back, any refuse was brushed into the pits, and the contents were then liberally sprinkled with straw and crude oil. These were then fired, and as soon as the flames had died down sufficiently so as not to endanger the wooden seats, these large boxes were slammed back into place, so as to include as much as possible of the dense smoke under the covers.

"In addition to this, lime and crude oil were liberally used in the urinals. This very simple procedure, carried out systematically day after day, kept these latrines in an agreeable and sanitary condition. At no time, in spite of the large numbers of men in camp, and with the prevailing intense heat, was there anything disagreeable in connection with them.

"Flies were noticed only by their absence; and, as showing how this condition was appreciated by the veterans, I include a paragraph of a letter from one of these men:

" On the 3rd of July, we missed one of our number, an old Welshman, 76 years old, with a broken leg, a bent body, supporting himself with a cane. We could not find him in any of the hospitals, nor could the boy scouts find him. As he was a sober man, the puzzle was great. Finally one of our mess found him sound asleep in one of the latrines. He said it was a cool place; no flies there!'

" There still remained to be disposed of 240 night-cans of refuse and urine. These were large galvanized covered cans, placed at intervals throughout the company streets, for the purpose of collecting the night urine and other refuse.

" These cans were collected each morning by teams, and were deposited at the central incinerator plant, which consisted of 6 regular pit incinerators, from 10 to 14 feet in diameter, and about 4 feet deep, placed in the center of the camp.

" These central incinerators certainly justified the dependence which the Army Medical Department places on this form of incinerator for the handling of camp-garbage, and only three were in operation at one time. As high as 2500 gallons of water-soaked sludge was consumed in one single incinerator in one day."

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HINDRANCES TO THE EXTENSION OF UNIFORM METHODS FOR VITAL STATISTICS IN THE UNITED STATES.

Cressy L. Wilbur, M. D.,
Chief Statistician, Bureau of the Census, Washington, D. C.

Read before the General Sessions, American Public Health Association, Colorado Springs, September, 1913.

The persistent worker for an efficient system of vital statistics for the entire United States must necessarily be an optimist. I do not mean to include under this term that class of persons who, as it might be said, "do not know enough to come in when it rains," nor who persist in believing this to be the best of all possible worlds in certain respects, despite rather obtrusive evidence to the contrary. I mean that the laborer for better registration methods must have a large amount of faith on the evidence of things as yet unseen, and must hold fast to each bit of encouragement and success that comes in the extension of better methods of recording births and deaths in this country, without dwelling on the comparatively slow progress, the disheartening indifference and ignorance found even among those who might be presumed to be active friends of better methods, and the almost insuperable difficulty of securing *thorough enforcement* of registration or any other laws in the United States.

My title gives me permission to touch upon the dark side of registration work. I shall try, however, to give due credit even to the obstacles, and first I shall call attention to the fact that the progress of vital statistics in the United States has been more rapid during the past decade, during the past few years, and especially during the present year, than ever before. And a large part of the credit for the movement for uniform and effective legislation, including the adoption of the Model Law and its underlying essential principles first formulated by a committee of this Association, the standard certificate of death, and the rules for statistical practice, is due to the American Public Health Association and dates more particularly from the meeting held at Denver in 1895.

We are progressing, therefore, and progressing rapidly. In some localities we are perhaps progressing too rapidly, that is to say, more is being undertaken than can be thoroughly and completely carried out. But we are not progressing as rapidly as many would desire, especially those who are entirely uninformed as to the practical difficulties in the way of administering registration laws in the United States as a whole, or even of the deficiencies of registration in their own vicinity. I take as an example of ordinary public opinion an editorial from a daily newspaper which has devoted more than the ordinary amount of helpful attention to the matter of better vital statistics:

"THE FIGHT FOR THE BABIES.

"The Children's Bureau, seeking first of all the detailed facts about mortality among children, wants the states to help it by establishing complete systems for getting the facts together. It has estimated, from figures that are kept in eight states, that 800,000 [300,000] children die annually at ages less than one year.

"It is plain enough that if eight states can establish systems under which complete vital statistics may be had, forty others are able to do it, and ought to. The census is not the right authority to handle this work, because it does not maintain a constant touch with the community. But between the cradle and the grave, what with the doctors, the coroner, the undertaker, the insurance folk, the newspapers, the neighbors, and the tax collectors, there are so many authorities on vital affairs standing around that it seems inexcusable that this country should have practically no worthwhile data of this sort. It is merely a matter of imposing requirements and penalties. The states' coöperation must be had, and it seems that this is one matter in which coöperation and uniformity of statutes would commend itself so completely, and the object would be so manifestly desirable, that uniform state laws should be attainable with comparative ease.

"The truth is that there is need for creation of some central agency for the very purpose of promoting coöperation, in matters of this sort, among the states. That none such has ever been established indicates an oversight at a point where practical consideration would have suggested it. It would not be very expensive, and ought to open the way for many useful accomplishments.

"The National Government could well furnish the impetus and the means for initiating such a movement, and, once the states had enlisted themselves, recommendations from the central body would certainly receive attention at the hands of the legislatures."

Easy and simple indeed! I wonder why the idea has occurred to no one to call the attention of the forty states that do not possess complete and satisfactory registration of *births and deaths* to the importance of the subject. Then, it being "merely a matter of imposing requirements and penalties," this is a matter "in which coöperation and *uniformity* of statutes would commend itself so completely, and the object would be so manifestly desirable, that uniform state laws should be attained with comparative ease."

The editorial is instructive because it fairly well represents public opinion on this subject, which does not appreciate the difficulties—due largely to the uninformed public opinion itself—that stand in the way of enforcing complete registration of vital statistics in the United States. Not even eight states—as I showed you in the map—have succeeded in obtaining fairly complete registration of both births and deaths. Not even the city of Washington does this, the laws for which are made directly by Congress. So it is not a mere matter of "imposing requirements and penalties" even in the District of Columbia, let alone states with sparsely settled and perhaps largely illiterate populations. Those of you who know of the growth of the registration area during the past decade, and have been on the fighting line in the work of extension conducted by the Bureau of the Census in coöperation with the American Public Health Association, the American Medical Association, and the authorities of many states, will smile at the suggestion that some new centralizing agency is chiefly necessary. If this were the fact, and if legislatures would adopt laws recommended by governmental authorities and enforce them when adopted, then we could ride at once, "on flowery beds of ease," to perfection in this respect, and the hard work, "lobbying" (if one may apply a term now thoroughly disreputable to the decent advocacy of proper registration laws), together with the disappointment and failure oftentimes encountered in the promotion of such legislation, would be done away with.

First and foremost in the mind of the average reformer is the "passage of a law." It sometimes seems as if this were the cheapest and most effective way to dispose of a proposition of reform. How rarely does thorough enforcement follow the passage of any law! Indeed, if I should be asked what is the greatest, the underlying, the everywhere present, and, so far as our present experience extends, the insuperable difficulty or hindrance to the effective registration of vital statistics in the United States, I might reply: "Contempt of law."

This contempt now permeates the whole mass of the American people. We are coming to despise both laws and the making of laws. Any law of general application that is not enforced uniformly and fairly, without prejudice or favor, and upon all persons alike, is contemptible before the bar of justice. Professor Reinsch in his work on "American Legislatures and

Legislative Methods" states that in five years, 1899 to 1904, the total number of acts passed by American legislatures was 45,552, of which 16,320 were of a public or general character. Of the vast grist of crude, ill-digested, inoperable, and unnecessary laws, how few are enforced at all, or enforced with a fair degree of thoroughness? Many are stillborn from the date of their passage, some encounter the question of "unconstitutionality" on grounds that should have been considered, and avoided, in their preparation, and others become "dead letters" simply because no one has any particular interest in their enforcement or are systematically violated by a peculiar selective process on the part of the officials charged with their administration. A state registrar or a city health officer thus frequently enforces certain laws or certain parts of laws committed to his authority, while he practically disregards other laws or parts of laws that are equally binding and equally dependent upon his faithfulness of execution. Thus we have, practically, an additional law-making body, upon whose discretion—although the *law* may have given no discretion but made enforcement an imperative duty—the actual execution of the law depends.

How many health officers in the United States even make an attempt to *enforce*, by the penalty of the law, failure or neglect to register births? But birth-registration laws are probably about as well enforced as the great generality of laws. When the penalties for the most grave offenses, even murder for example, are not enforced, or enforced in such a small proportion of cases that the probability of the infliction of the penalty prescribed becomes quite negligible, what with appeals from court to court, and all the means of delay and escape with which we are all so familiar, is it likely that comparatively trivial offenses will be punished? In fact they are not, and the enforcement of registration and other laws of similar character has been largely a farce. So common is this condition that the actual thorough *enforcement* of a new excise law in the District of Columbia, with infliction of the penalty of the law in *every* case of violation, has become a sort of nine-days' wonder. Other regulations are subject to spasmodic enforcement. For example, the requirement that all dogs shall be muzzled is at present receiving some attention, several individuals having recently been bitten by rabid dogs; but between such intervals little attention is paid to the provision, and even in times of greatest efficiency probably less than half of the dogs are equipped to comply with the law. Until we reach a higher plane of respect for *law* and the general public demands that all laws shall be carefully considered before enactment and then carried out to the letter, we cannot expect complete registration of births and deaths. An efficient registration law contemplates no deficiencies. Practically every birth and every death *must* be recorded in order to afford reliable statistics and to insure proper legal records for all persons dependent upon them. The provisional basis of 90 per cent., without which no registration area could have been formed, is merely a makeshift until more effective registration shall yield records that are practically complete.

I have dwelt upon the disregard for law as the principal hindrance in the way of obtaining vital statistics for the United States. Until this can be overcome, and the process of education is necessarily a slow one, we can not expect as complete registration of births and deaths as in those countries in which the first presumption with respect to a law is that it is made to be obeyed, not neglected and disregarded. We must cultivate respect for law and insist upon the enforcement of law, even at times with some hardship to the individual, in view of the greater good that will result to all citizens and to the state from such enforcement. We must become law-abiding instead of law-defying as a nation, and public opinion, without whose support in a democracy the forms of law become merely objects of derision, must be trained to recognize the fundamental importance of vital data and to demand the uniform, thorough, unremitting execution of the measures adopted for securing them.

It may be of interest to mention some of the obstacles that have delayed the progress of uniform registration of vital statistics in the United States:

(1) The American Public Health Association. The American Public Health Association *ought* to be the largest, most influential public health organization in the country, with thousands of trained sanitary workers, each of whom should be firmly convinced, as the Association is most earnestly convinced—theoretically—that vital statistics are the absolutely necessary bases of all modern public health work and that the complete registration of births and deaths *must* be insisted upon as the first and indispensable step in proper sanitary organization. I am not unmindful of the great debt that American vital statistics will always owe to the American Public Health Association, to whose action we are indebted for the general adoption of the International List of Causes of Death, the Model Law for the registration of births and deaths, the Standard Certificate of Death, and the institution of the section on vital statistics with its rules for statistical practice that are doing so much for uniform vital statistics in this country. I only regret that the Association is not larger and that it does not fully occupy the position that it should, in view of its long and honorable history, as *the* great unofficial public health agency of the country, whose directive impulse should be the inspiration and the guide of all the many diverse public health movements that have so multiplied of late. It should be able to *command*, by force of scientific authority, proper provision for its fundamental necessity—adequate registration of vital statistics. As a matter of fact very little aid has been received from the Association in the promotion of recent registration laws. While it is true that a large proportion of the work for the extension of proper registration methods has been undertaken by the American Medical Association, the American Public

Health Association, which began this work, should continue to coöperate actively, and I believe that it would be desirable that a larger proportion of the attention of the general Association, not merely its special section, should be devoted to the subject.

Certainly the members of the Association should be fully informed with respect to the principles and methods recommended by the Association. Some attacks have recently been made upon the Model Bill, and the opportunity of passing a good law for Illinois was lost because a committee, largely composed of sociological authorities, rejected the Model Bill, which was grossly misrepresented to them, in favor of an inferior measure which, probably fortunately on the whole, failed to pass. It was said to them that "The statement of occupation on the Standard Certificate of Death, giving the last occupation, was not only worthless from a statistical standpoint, but it was misleading." You all recall the pains taken by this Association preliminary to the work of revising the standard certificate at Richmond in 1909. If this assertion were true, then its action at that time would be subject to very serious criticism and all the states and cities that have employed the standard certificate would be in a very serious predicament, as well as the Bureau of the Census, which has indorsed it and employed it for all transcripts of deaths, and the American Medical Association, American Bar Association, and other organizations which have incorporated it in the revised Model Law. As a matter of fact the assertion was entirely unfounded. The Association was well advised in not undertaking to complicate the difficult statement of occupation and industry with the double statement of last and former occupation and industry. Careful checking of transcripts based upon a form attempting to collect such additional data with the original certificates showed that the proportion of cases in which the duration of any cause of death stated was greater than that of the last occupation was negligible (about 1 per cent.),* while a very considerable proportion of errors of transcription, largely due to the use of a different form of certificate for the collection of the data and involving changes in the classification of occupation to the extent of over 15 per cent., appeared. Until it is possible to obtain much better statements of both special occupation and industry upon certificates of death, it is absurd to insist upon additional data. The necessity of uniform certificates in order to obtain comparable data is plainly shown. I hope that in time the broad view of national uniformity will outweigh any local preferences. Certainly if the states can not come together in the comparatively simple matter of the adoption of a primary schedule for recording deaths, after full discussion in this representative Association, it would seem hopeless to attempt more difficult measures of uniformity, such as the adoption of standard tables and precise rates. But I hope that further consideration will lead to union and the waiving of individual preferences for the sake of general agreement.

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*Only a very few of this small percentage were cases that would justify selection of the former occupation.

In this connection I am very glad that we now have in the Association a sociological section. I hope that it may soon have a joint session with the section on vital statistics, for I believe, as indicated by the social program of the Southern Sociological Congress, which "stands for the adoption of the uniform law on vital statistics," that the registration of births and deaths, sickness, marriages and divorces, and the thorough analysis of the data thereby obtained, are of the first importance to the correct understanding of our social conditions. I did not intend to refer with any disrespect to the unfortunate action of the Chicago sociologists with respect to the Model Law and the standard certificate; they had no acquaintance with matters of practical vital statistics and very naturally believed statements, even the most absurd, that came with seeming authority. But it is time that all social as well as sanitary workers should become informed on this subject, and association with the registration officials will be beneficial for this purpose while the registration officials will also be able greatly to broaden their views as to the significance and usefulness of the data with which they deal.

(2) State public health officials. While I believe that the subject of vital statistics is today receiving more effective attention from state sanitary officials than ever before, I do not believe that it has yet attained that share of their attention and financial support that its importance demands. In too many states the chief attention of the administration officers is devoted to other subjects, leaving the conduct of the registration work in untrained hands or not giving it a full measure of support when the actual test of *enforcement* of law arises. Sometimes an unnecessary amount of statistical detail is attempted in the compilations while the thorough enforcement of the law in all parts of the state, on which the validity of the data depends, is neglected. A dangerous condition that arises in the extension of the registration area is the too early expectation of results. As Americans, we are prone to the adoption of get-rich-quick methods and look for immediate recognition of the completeness of registration too soon after the adoption of a law. Not even the Model Law can procure complete or approximately complete registration until a reasonable time has elapsed for it to be put into thorough and complete operation over the entire state. In some cases special obstacles occur in administration, owing to the difficult character of the country, insufficient financial support, lack of experience, of registration officials, sparse population, or large percentage of colored or illiterate population; such difficulties must be taken into consideration and state officials should not be discouraged if they cannot at once command success.

(3) City public health officials. The same difficulties arise in city as in state administrations of registration laws. The defects of birth registration are especially noteworthy in the vital statistics of many of our cities because it should be perfectly practicable for municipal health authorities to insist upon and obtain practically complete registration of births. They should certainly insist upon strict compliance with the Rules of Statistical Practice adopted by this Association in the preparation of their annual reports and bulletins, but in a considerable number even of our largest cities those recommendations are neglected. Unfortunately, in too many cases the statistical work in our city offices is in totally unskilled and incapable hands. It should be regarded as of the *first* importance and should be organized as efficiently as the laboratory work or any other part of the city health administration.

(4) The medical profession. Too much credit cannot be given to the physicians of the United States for their devoted work in connection with the passage and enforcement of laws for vital statistics. In recent years much of the increase in the registration area is due to the active coöperation of the American Medical Association, through the efforts of Dr. Frederick R. Green, secretary of its Council on Public Health, which has devoted a large part of its annual meetings to this subject and distributed many thousands of copies of the Model Bill in states where legislation for vital statistics was under consideration. The profession as a whole cordially appreciates and supports the registration of vital statistics, although by the operation of such laws physicians are required to file certificates of birth and to fill out the medical certificates of causes of death, usually without special compensation. The question of payment for such returns is a matter for the consideration of each state, although the committee that revised the Model Bill was for the most part opposed to it. Whether payment is made or not, it is necessary that the law be enforced upon a uniform basis and that all births and deaths be registered. Hence the sentiment of the profession should not only support the installation of vital statistics laws but should insist upon their thorough enforcement, by prosecution of delinquent members of the profession if necessary. Only a small proportion of the physicians, as a rule, would continue to neglect their duty in the face of the general opinion that it was unprofessional conduct to fail to perform the duty to the family, to the state, and to society generally that is implied in the registration of vital statistics.

(5) The legal profession. A large part of the help that is desired from the legal profession would consist in the more thorough consideration of legislation by the lawyers who form such a large proportion of our state legislatures and the moral support of the bar and bench in the effective enforcement of registration laws. The value of such records for important legal and judicial purposes will commend itself at once to those engaged in

the practice of law, and I am very glad to state that the American Bar Association appointed a representative to aid in the recent revision of the Model Bill and that the Committee on Vital and Penal Statistics of the Conference of Commissioners on Uniform State Laws is also actively interested.

(6) Lastly, and most important of all, the interest of the people is not yet sufficiently awakened to the importance of the registration of births and deaths. Most of all do we need the support of the "better half" of the population—the women—and we are just beginning to get it, largely through the interest developed in the work of the recently established Children's Bureau. The work of that bureau is handicapped by the lack of statistics of infant mortality, owing to the absence of thorough birth registration. It was established by Congress for a great and beneficent purpose, the protection of infant and child life, and when the mothers of the country realize that the accurate registration of births and deaths in all parts of the United States is an indispensable means for its full development and successful work, I believe that there will be an irresistible demand that the births of their children shall be recorded. The registration of births has been especially defective in Colorado. Where women's voices and votes are potent in political action should certainly be the beginning of reform in this respect, and I hope that the women of this state will take an active interest in ascertaining the causes and remedying the conditions whereby the registration of births in Colorado has not been complete.

POSSIBILITIES OF REDUCING MORTALITY AT THE HIGHER AGE GROUPS.

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Read before the Section on Vital Statistics, American Public Health Association, Colorado Springs, September, 1913.

Particular interest has been concentrated, during the last decade, on the mortality at the higher age groups. The unfavorable changes which have been observed in the death-rates at these ages are in striking contrast to the conditions at the younger ages, where, during the last fifty years, marked improvements have occurred in both sexes. This contrast has occasioned much comment from sanitarians, the medical profession, and especially from insurance executives, who, as you can well understand, are deeply concerned with the vast possibilities of checking losses from premature mortality. The interest of the community, however, is paramount to all others in view of the great value to it of each adult, not only in economic terms, but also in the larger social aspects which are involved in the serious disturbances to family life resulting from the death of a parent or a wage earner.

A very significant contribution to the discussion of the subject is the report of Dr. Irving Fisher of the Committee of One Hundred on National Health. In this report, Doctor Fisher pointed out that the causes of death which predominate at the higher age groups were preventable to a degree, and that, if the diseases and conditions involved were controlled to the extent of the facilities of modern medicine and sanitary science, there would be added to the expectation of life at least one and one-half years at age 45. This judgment of Doctor Fisher is extremely conservative in view of the fact that his estimates did not include the possible saving from tuberculosis which is a considerable mortality factor at the older ages, and also because he assigned no coefficient of preventability to the various forms of cancer, which, since his writing, have shown a large measure of possible control.

It is impossible at this time to estimate in years and days with any degree of precision what saving in middle life can be accomplished. But it is increasingly evident to competent observers that the attitude taken by Doctor Fisher was more than justified and that the possibilities for human conservation at the present time are much more hopeful than they seemed five years ago. It is the purpose of this paper to consider some of the elements which enter into the mortality saving in the higher age groups and to show what the possibilities are for the control of the conditions which determine these rates.

MORTALITY CHANGES IN TEN YEARS.

I present herewith Table I, which gives the death-rates for males and females for the years 1900 and 1911, respectively, for the registration states as they were constituted in the year 1900. These included Connecticut, District of Columbia, Indiana, Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Rhode Island and Vermont, which states enjoyed good registration conditions at both dates. The figures presented, therefore, are quite comparable for the two periods. Figures earlier than those for 1900 would be most desirable for comparison, but they cannot be obtained.

TABLE I.

COMPARISON OF MORTALITY OF MALES AND FEMALES BY AGE GROUPS. DEATH-RATES PER 1,000 POPULATION.

(Registration States as constituted in 1900.)

Age.	Males.			Females.		
	1900.	1911.	Per Cent. Increase or Decrease.	1900.	1911.	Per Cent. Increase or Decrease.
Under 5	54.2	39.8	−26.57	45.8	33.3	−27.29
5–9	4.7	3.4	−27.66	4.6	3.1	−32.61
10–14	2.9	2.4	−17.24	3.1	2.1	−32.26
15–19	4.9	3.7	−24.49	4.8	3.3	−31.25
20–24	7.0	5.3	−24.29	6.7	4.7	−29.85
25–34	8.3	6.7	−19.28	8.2	6.0	−26.83
35–44	10.8	10.4	− 3.70	9.8	8.3	−15.31
45–54	15.8	16.1	+ 1.90	14.2	12.9	− 9.15
55–64	28.9	30.9	+ 6.92	25.8	26.0	+ 0.78
65–74	59.6	61.6	+ 3.36	53.8	55.1	+ 2.42
75+ and over	146.1	147.4	+ .89	139.5	139.2	− 0.22
All Ages	17.6	15.8	−10.23	16.5	14.0	−15.15

You will observe that, for the males, all age groups up to and including 35–44 show decreases in the mortality rates for 1911 in comparison with those for 1900, the percentages of decrease ranging from 27.66 for the age group 5–9 to 3.70 at the age group 35–44. From this age group onward, the rates for 1911 are persistently higher than for the earlier date, the largest difference being at age period 55–64 when the percentage of increase reaches 6.92. For females, the decreases in the mortality rates extend up to the period 45–54, inclusive, the decreases varying from 32.61 per cent. at the age group 5–9 to 9.15 per cent. at the age group 45–54. The ages 55–74 show a slight increase and above 75 the rates for the two periods are virtually identical. It is evident, therefore, that at all ages, the mortality has been much more favorable for the females than for the males, but, in both sexes, the various forces which have been at work to reduce mortality, suddenly lose their effectiveness during the period of middle life at which time an actual deterioration occurs. Above age 75, no significant changes have taken place and we are not much concerned with a problem of "old-age" mortality.

THE INCREASED FREQUENCY OF CERTAIN CAUSES OF DEATH.

It is necessary, therefore, in our analysis to concentrate attention on the diseases and conditions which cause the larger part of the mortality at the advanced ages. These include cancer, diabetes, apoplexy, organic heart disease, diseases of the arteries, cirrhosis of the liver and Bright's disease. The least median age at death of this group is about 55 years. Together, they form 51.2 per cent. of all deaths at age 40 and over, in the industrial mortality experience of the Metropolitan Life Insurance Company during 1911. The corresponding percentage in the Registration Area is 51.4.

Table II shows the rate per 100,000 for each one of these causes for the years 1900 and 1910, respectively, in the Registration States as constituted in 1900.

TABLE II.

DEATH-RATE PER 100,000 OF POPULATION FOR CERTAIN CAUSES OF DEATH—MALE AND FEMALE COMBINED.

(Registration States as constituted in 1900.)

Cause of Death.	1900.	1910.	Per Cent. Increase.
1. Cancer (all forms)	63.5	82.9	30.6
2. Diabetes	11.0	17.6	60.0
3. Cerebral hemorrhage and apoplexy	72.5	86.1	18.8
4. Organic diseases of the heart	116.0	161.6	39.3
5. Diseases of arteries	5.2	25.8	396.2
6. Cirrhosis of liver	12.6	14.4	14.3
7. Bright's disease	81.0	95.7	18.1
Total	361.8	484.1	33.8

It is evident from this array that the rate per 100,000 has increased considerably in all of the causes mentioned, the rate for the seven diseases combined being 33.8 per cent. higher for 1910 than for 1900. The largest increases are to be observed for the circulatory diseases, namely, the diseases of the arteries and organic heart diseases, the former having increased close to fourfold in the ten years. Similar conditions have been noted by registration officials throughout this country and in foreign lands and it may safely be said that the increased frequency in the degenerative diseases pointed out above represents a distinct tendency in modern life which is worthy of the most searching attention.

We will now proceed to discuss the factors which, we believe, are in a large measure responsible for the conditions observed. In general, it is clear that we must look to the conditions of life in the earlier ages for an explanation. The organism at fifty is little more than what the preceding years have made it. The hereditary factor, or the so-called physical endowment of birth, must, to be sure, be considered; but, at this advanced age, its importance is largely overshadowed by direct influences of environment which have continuously modified the physique. We shall consider this early environmental influence under three heads, namely,

(a) The occurrences of disease in childhood and early adult life.

(b) Habits and modes of life, including especially such as constitute what insurance men call the "moral hazards," and

(c) The effects of occupation.

THE EFFECT OF THE COMMUNICABLE DISEASES ON MORTALITY.

In the first place, such diseases as organic heart disease and Bright's disease, which are exceedingly prevalent at the advanced ages, are often the sequelæ to diseases occurring previously, namely, the acute infections of early life. I need only refer here to the many cases where scarlet fever, diphtheria, acute articular rheumatism or typhoid fever have left the patient impaired, either in the circulatory or in the renal systems. Medical literature is replete with incidences of chronic nephritis which have followed in the trail of scarlet fever and of heart and vascular lesions which had their origin in typhoid fever and acute articular rheumatism. These impairments often go unnoticed until, under the stress of middle life they terminate in one or another of the degenerative diseases which we have just considered. In such cases, the initial cause is usually not indicated on the death certificate and it is, therefore, not possible for the statistician to evaluate the importance of this factor. That it is significant, however will, I believe, remain unquestioned.

This view of the effect of the acute infections must not be confused with that of other students who, in their discussion of the mortality conditions at the higher ages have assumed that the acute diseases serve as a sort of filter for the elimination of weaklings who would not ordinarily reach a ripe old age. These writers have asserted that the decreased incidence of these diseases during the last two decades has diminished the force of natural selection against the weaker stock and that, as a result, the mortality at the higher ages has been correspondingly increased. I believe that the weight of the emphasis should be placed at the other end of the beam. Whatever may be the increase assigned to the element which they point out, the direct results of the infections that occur in early life, and which leave serious impairments in heart and kidney, must be much more significant. We must, therefore, concentrate more and more attention upon the elimination of the communicable diseases of early life in order to reduce the mortality at the higher ages. In the future, the rate from such diseases as organic heart disease and Bright's disease will serve as an additional measure of the efficiency of present-day control of the communicable diseases of childhood and youth.

THE EFFECT OF VENEREAL DISEASE AND ALCOHOL.

Secondly, the habits and modes of life have their effect upon the mortality at the later ages. Details of personal hygiene, such as a rational diet, a reasonable amount of exercise, regular bathing and those subtle refinements of mental hygiene, which are designed to conserve nervous force, are of great significance. Most important, however, for our discussion, are the effects of the venereal diseases and of the intemperate use of alcoholic beverages.

The earlier incidences of gonococcus infection and syphilis have a decided effect upon the mortality at the later ages from the serious circulatory, nervous and genito-urinary diseases which they induce. In the male, gonorrhœa often develops serious involvements of the vascular system and, in the female, we observe such complex pelvic disturbances as are responsible in so large a degree for many of the operations which result in a significant part of the female mortality over age 45. Syphilis affects the nervous and circulatory systems, ultimately giving rise to circulatory and spinal lesions, which terminate in conditions reported as "locomotor ataxia," "cerebral hemorrhage," "paralysis" and the various types of mental alienation. We have the authority of Osler that in nearly 90 per cent. of the locomotor ataxia cases, we find a syphilitic personal history. There are no similar figures available for the other degenerative diseases, but syphilis surely plays a prominent part in providing the initial changes which terminate in the causes mentioned. Health officers should, therefore, give their active support to all movements which are directed at the control of the venereal infections.

The effects of the intemperate use of alcohol upon middle age mortality are closely related to those of the venereal diseases; indeed, there seems to be a distinct correlation between these two forms of indulgence. The statistical analysis of the subject is full of difficulties in view of the reticence of physicians to report the facts of alcoholism on the death certificate. Yet the evidence is unmistakable that there is a marked influence on middle- and old-age mortality from this cause. The title "Alcoholism" (acute and chronic) in the census returns showed, in 1911, the not very significant rate of 4.9 per 100,000; but this is only a trace of the deaths resulting from alcoholism. No one can estimate the annual mortality loss that is hidden behind such returns as "pneumonia," "acute and chronic nephritis," "cirrhosis of the liver," "organic heart disease" and "arteriosclerosis," all of which causes are now, as we observed, on the increase in their incidence at the higher ages. If further evidence of the causal relation between alcoholism and higher mortality were necessary, we should need only refer to the body of facts which have been accumulating in insurance offices showing that total abstainers are by far the best risks and that the mortality rates observed in various occupations are significantly tinged by the degree of exposure to alcohol which is characteristic of the occupation.

We cannot, therefore, observe without alarm the reports of the steadily increasing consumption of alcoholic beverages in the United States during the last thirty years as shown by the reports of the Commissioner of Internal Revenue. In the period 1881–90, the per capita consumption of liquors and wines was 13.21 gallons, whereas in 1912 the figure per capita had risen to 21.98 gallons, an increase of 66.4 per cent. since the earlier date. In this changed condition, almost the sole contributing factor has been the consumption of malt liquors. We are becoming, as a nation, too free in the use of alcohol, and it is high time that the lesson which Germany has apparently learnt and is taking to heart, as is shown by the reductions in the consumption of alcoholic beverages recently observed in that country, were applied among us before further damage is done.

The Effect of Occupation.

Third, and most important, in our discussion of the factors contributing to middle age mortality, are the effects upon the body of the habits and conditions of work. This is what we may call the occupation factor. We are all familiar with the picturesque example of the modern business man who is supposed to work at white heat and under great pressure and who, as a result, presents long before due time the classic picture of the broken-down human machine suffering from the whole gamut of the degenerative diseases. The sanatoria and watering places of Europe annually reap their harvest from this product of American commercial life. But we cannot be much concerned with this small group in our discussion. They do not modify our death-rates materially which are determined rather by the conditions of life and work prevailing among the industrial classes of the country. We must, therefore, turn to this much larger group, who, unfortunately, have not received sufficient attention from medical men, in their search for the factors of occupational stress.

The character of American industry has completely changed in the last fifty years. Formerly, most work was conducted in the manner of the hand trades; today, there is evident all along the line a specialization of industry which brings together under one roof large numbers of workers, each one performing some small and distinctive part of the total process. This condition may be best exemplified, perhaps, by the changes that have occurred in the manufacture of shoes. Only a few generations ago the entire process of shoemaking was in the hands of individual workmen each one of whom performed every operation in the process of making a shoe. Today, in cities like Brockton and Lynn, there are immense establishments where shoes are made entirely by machine processes directed by specialist workmen who perform at high speed and over long hours, one or at most a few operations in the production of a shoe. What is true of shoemaking is characteristic of other large industries.

This specialization has not been carried to its present degree of perfection without having left its mark upon the individual workman. He no longer enjoys the pleasure incident to the performance of a whole task. The unceasing whirl of high-speed machinery, the persistent noises of the shop and the necessary nervous accommodation to the rapid movements of the machines result, after long periods of time, in distinct psychoses. Our vital statistics are not as yet sufficiently refined to indicate the precise effects of these nervous conditions upon the health of the worker and we can, at present, only speculate upon the importance of this factor. There are, however, sufficient suggestions from physiology and pathology that these vague derangements of the nervous system, due to speeding-up processes and to the general maladjustment of individuals to their work, may result ultimately in distinct lesions of the heart and kidney. Many cases of tuberculosis and other serious affections of early life may be traced to the lowering of normal vitality which follows occupational stress. It is our contention that this element also plays a large and hitherto unsuspected rôle in the causation of the diseases of later life. I urge for serious consideration a study of this phase of occupational hygiene.

Apart from these subjective changes which, we believe, have occurred as a result of the specialization of industry, we must consider those objective phases of occupation which are inseparable from present-day working conditions. The presence of large numbers of workmen under one roof brings about new and distinct problems of hygiene in industry. The large shop at once raises the question of the purity of the air supply, its temperature and humidity, the adequacy of natural and artificial light, the provision of lavatories and other sanitary facilities, together with a host of minor details which in their entirety markedly affect the health condition of the individual workman. The effects of high temperatures and humidity upon the health and longevity of workpeople are best illustrated by the disheartening conditions revealed by Perry in his monograph on the cotton-mill operatives. The extreme variations in temperature, as observed in the steel mills, have long been known for their disastrous effects upon the workmen engaged therein, especially with regard to the high incidences of rheumatism and pneumonia, both of which play a prominent part in middle-life mortality.

We must also consider the factors of dusts, fumes and poisons which play a significant part in present day occupational mortality. The dusts, especially those of metallic or mineral origin are well known for their effects upon the respiratory system. We should remember in this connection that many who become incapacitated for continued work at the dusty trades often enter other and lighter work, dropping thus in the scale of economic efficiency and later succumb to other conditions of middle life. The fumes and poisons, especially those which arise in the refining and handling of lead, copper and arsenic, in like manner, cripple thousands early in life, throwing them on other industries for indifferent employment and support. Middle-age mortality returns, as they come into our statistical laboratory for study, are loaded with indications of occupational poisonings of one sort or another in early life. In no other way can we explain the large incidence of the degenerative diseases in those cases of apparently negative occupations at death, which on further inquiry reveal the previous employment in trades like that of the painter, compositor, or laborer in paint, rubber and color works.

Measures of Control.

This high mortality of middle life is thus largely a resultant of our occupational conditions. What measures may we then employ in our attempts at relief? Essentially our future endeavors will, we believe, take the following directions:

1. The further development of that type of efficiency engineering which will result not alone in economies of production but in such economies of human effort which will conserve the health and life of the individual workman. The first viewpoint is that of the industry, while the second is essentially that of society as a whole. This program will take into account the radical improvement of the conditions of work such as the hours of labor, the sufficiency of light, the purity of air, and the maintenance of a favorable temperature and humidity in the shop. This will involve the enactment and enforcement of far-sighted labor legislation. Such efforts will amply repay employers and the state for the additional expense involved in increased product on the one hand and in the extension of the span of life on the other.

2. The medical examination of workmen, both at the time of their entrance into the industry and periodically thereafter. A medical examination will often discover the presence of the organic diseases which we have been discussing and will encourage the early application of remedial measures. Many instances of this kind of enlightened management are

already in evidence. The North Company of Worcester, Mass., during the past year has instituted the physical examination of its twelve hundred employees. Persons, suffering from physical defects, are informed of the fact and are advised to secure proper treatment. In some cases, where the nature of the work has tended to aggravate the condition, a change of occupation is arranged. An extension of this programme should be recommended by health officers and social workers to the managers of industrial establishments. In this way the community will receive the benefit of a comparatively inexpensive and most effective measure for life conservation.

3. The education of workmen and employers in the essentials of occupational hygiene. By means of lectures delivered in the factory and before trade organizations, workmen can readily receive instruction which would result in the prevention of diseases and accidents. Pamphlets should also be widely distributed. No programme of conservation in industry can be thoroughly successful unless it has the active coöperation of the workmen themselves.

4. The close study by officers of the departments of health and labor of death certificates to discover whether proper preventive measures had been taken to prevent the death when it is suspected that industrial conditions were at bottom responsible for the disease or condition reported. In this way, we shall be able to determine what industries are contributing, abnormally, deaths from preventable accidents, from poisonings and from other important occupational causes. Health and labor officials should determine in each instance whether the labor laws had been complied with, and see that the guilty persons are prosecuted for violations. This programme is carried out fully in Great Britain by the medical officers of health of each district.

Diabetes and Cancer.

Two diseases, diabetes and cancer, which play an important part in the mortality at the higher ages, still remain for our brief consideration, While the definitive causes of both diseases are still obscure, considerable progress has been made recently in our therapeutic control of them. Research directed in the field of the chemistry of metabolism has done much toward checking the course of diabetes, especially in early cases. We may expect results from the clearer realization that many cases of the disease have their onset in the metabolic disturbances which follow tubercular and traumatic conditions. It will be the particular function of the periodical medical examination of workers to discover incipient cases of this disease, a large number of which, at the outset, can readily be managed.

The cancer situation is much more involved. The increase in the mortality rate from cancer has been very decisive, but there are indications that the rate has probably reached its high-water mark. Altogether, the outlook for its control was never brighter than at the present time. Not only are the recent contributions of the research laboratories to the pathology and etiology of cancer most encouraging, but progress is also reported in the surgical and ray treatment of the disease. Great promise, moreover, is held out by the campaign of popular education which is in full swing on all sides. The aroused interest of the public and the better and earlier diagnoses by physicians will lead to the discovery of many cases in the early stages and will present them for surgical treatment. More especially should efforts be concentrated upon the education of women in the practice of consulting the physician or surgeon upon the merest suspicion of the appearance of cancer of the female genital organs. Even at this time, most cases come to the operating table all too late. It is against the fatal policy of delay that the efforts of most public bodies interested in the problem should be directed.

In conclusion, we should add a few words of commendation for the movements which have recently developed for the better care of persons in middle life, afflicted with functional disturbances of the heart and kidney. The proper care of these cases, with reference to choice of occupation, will lead often to the prolongation of life. Many of those afflicted can participate without much injury to themselves in gainful occupations if properly directed, where without such guidance they soon overtax their limited energies and become unfit for any work. It should be kept in mind, however, that such a policy useful as it undoubtedly is, will have ultimately, the effect of increasing our mortality at the older ages. Such an increase should not be looked upon with any apprehension since it is quite normal and involves no social loss.

SUMMARY.

We may now summarize our discussion of the factors which enter into the possible reduction of mortality at the middle ages as follows:

1. We must place even greater emphasis upon the municipal control of the communicable diseases of early life in order to reduce the instances of heart and kidney impairments which often result therefrom.

2. We must encourage the movements directed against the spread of venereal disease as well as against the intemperate use of alcoholic beverages.

3. We must further all efforts for the improvement of adequate labor legislation and promote better understanding between employers and employees. This programme will include the improvement of factory sanitation, the medical examination of employees and the instruction of both employers and employees in industrial hygiene.

4. It will be necessary to supplement labor legislation with the careful examination of death certificates to see that in every instance those who are responsible for preventable deaths are properly prosecuted.

5. Finally, we must heartily encourage the movement for public education on all topics connected with personal hygiene that there may be better coöperation between physicians and their patients and that there may be no unnecessary losses sustained through neglect of symptoms pointing to serious organic diseases.

SANITARY CONDITIONS IN HAWAII.

George W. McCoy.*
Surgeon, United States Public Health Service, Honolulu, T. H.

General Considerations.

The Hawaiian Islands are very appropriately designated "The Cross Roads of the Pacific." The group consists of seven inhabitated islands lying almost directly in the line of travel from the western coast of North America to the Orient. Commercial relations and the exigencies of steamer traffic make Honolulu, the chief city of the archipelago, a port of call for vessels engaged in trade between the Far East and North and South America. Most of these vessels stop at Honolulu twice on each round trip. These considerations, while contributing to the commercial prosperity of the country, add to the complexity of its public health problems.

In addition to the ordinary commerce with other countries the immigration problem is vastly more important here than elsewhere. The labor supply in the Islands is totally inadequate to furnish all the help required by the various industries, chiefly sugar growing, and as a consequence it is necessary to import large numbers of foreigners. Formerly these people came almost exclusively from the Orient, but in recent years many have been brought from Europe, especially from Russia, Spain, and Portugal. Many of these men bring their families with them. A single steamer may bring a number of immigrants almost equal to 1 per cent. of the total population of the Islands.

Relation to General Government.

The Island of Oahu, on which the city of Honolulu is situated, is one of the most important *military and naval bases* in the possession of the United States. In the neighborhood of five thousand United States Troops are stationed here at the present time and it is quite likely that within the next few years the number will be largely increased. It is obvious therefore that the Federal Government will always have a very great interest in the sanitary conditions of the Islands. This is recognized by the Territorial Government as well as by those charged with the responsibility of caring for the public health interests of the Federal Government. At the request of the Territorial authorities an officer of the United States Public Health Service was detailed for duty as sanitary adviser to the Governor of Hawaii. It must not be inferred from this assignment that the Territorial health authorities are not efficient and energetic. The very reverse is true. The writer is not acquainted with any state having a more effective health department than that of Hawaii. It was felt, however, that on account of the importance to the United States of the sanitary conditions in the Islands it would be well to have the assistance of an officer detailed by the Federal Government. This is particularly appropriate inasmuch as Hawaii being a Territory and not a sovereign state is, in a sense, a ward of the general government. The intimate relation between Washington and Hawaii is shown by the fact that the Governor of the Territory is a Federal officer appointed by the President, not elected by the people as in the case of a state. In many other ways the affairs of the Territory are subject to supervision at Washington.

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* Detailed as sanitary adviser to the Governor of Hawaii.

LOCAL CONDITIONS.

The scattering of the population over the five Islands (two have such a small number of inhabitants that they may be ignored here), and consequently the comparatively small amount of communication between the various groups of people assists in the task of limiting any outbreak of a communicable disease. At the same time it makes difficult the transference of executive officials of the health department from one point to another.

A very large proportion of the population, perhaps half, live on sugar plantations. From a sanitary point of view, this is probably advantageous as the owners of the plantations have been educated by the Territorial Health Department to see that it is to their advantage to have the health conditions as good as they can be made. Furthermore, it is usually easier to deal with an intelligent, if somewhat obstinate, representative of a wealthy corporation rather than with a thousand individuals, the majority of whom are mentally incapable of appreciating the importance of sanitary precautions as well as being financially unable to carry out even relatively inexpensive measures.

The population of the Islands* is 191,909, made up of the following nationalities:

Japanese	79,663
Hawaiians	26,099
Portuguese	22,294
Chinese	21,698
Part-Hawaiian	12,485
Porto Ricans	4,828
Spanish	1,962
Other Caucasians	14,684
All others (including several thousand Filipinos)	8,196

This heterogeneous population, while on the average more amenable to discipline than an equal number of whites and, therefore, presenting fewer cases willing and anxious to indulge in litigation whenever the opportunity offers itself, is made up largely of people who do not willingly and readily come up to our ideals of cleanliness and orderliness.

The climatic conditions of the Islands leave little to be desired. They probably have no unfavorable influence on the sanitary problems of the Territory.

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*Census of 1910. At the present time the population is probably over 200,000.

The water supplies which in general are satisfactory are usually furnished by artesian wells, surface water collected from uninhabited water sheds, and rain water collected from roofs. There has been at least one serious outbreak of typhoid fever due to surface contamination reaching an artesian well.

The only article in the food supply that needs to be mentioned in this connection is *poi*, the national dish of the native Hawaiians. This substance is made from the tuberous root of the taro plant (*Colocasia antiquorum*). The root is washed, steamed, the skin removed by scraping, and the pulp pounded with a pestle until it has a doughy consistency. The mass is then usually kneaded by hand though in some factories this work is done by machinery. No further preparation is necessary except thinning with water. The poi is usually eaten from the fingers. Infection might be transferred from a "carrier" by hand kneaded poi, and a considerable number of persons infected with diseases like typhoid fever or cholera in the same manner as milk may convey them. The same thing may happen when the common poi bowl is employed, as is the case in many native families. Comparatively recently the health department has been given supervision over the poi shops and by means of medical inspection of the personnel an effort is made to obviate dangers that appear inherent to the industry.

HEALTH DEPARTMENT.

The Territorial Health Department is organized along the lines of a strongly centralized state administration. The local governments (counties) have control of such matters as markets, housing regulations, etc., but everything relating to infectious diseases comes directly under the Territorial Board of Health; indeed this body is the only effective health organization in the Islands. In a community, the total population of which is only about 200,000, there is no necessity for a division of authority and it is clear to the writer that the health functions now exercised by the counties should be directly under the Territorial Board. The President and other members hold office at the pleasure of the Governor. The President is the executive officer of the board and has direct control of all administrative matters. Sanitary inspectors cover practically the whole of the Territory. In some cases as on the sugar plantations the inspector is paid by the corporation whose sanitary conditions he supervises. This is obviously an undesirable arrangement but it is the only practicable one with the funds available. It would be better to have all of the inspectors paid by the Territory.

Government Physicians: The Islands have been divided into twenty-five districts with a Government Physician in charge of each. The duty of these officers of the health department is to look after sanitary matters in general, to conduct medical inspection of schools, report sickness, deaths, and births, and to render needed aid to the indigent poor. These physicians are paid monthly salaries ranging from $25 to $150. It is needless to say that thus subsidizing practically every physician on the Islands outside of the cities results in a very prompt notification of contagious diseases and in every way aids in carrying along sanitary work.

The entire personnel of the health department should be put under civil service rules that would permit of appointments for merit only, and dismissals for adequate causes alone. This should apply not only to subordinates but to the higher authorities in the department as well. There is no such plethora of capable sanitarians for important administrative positions in a community the size of Hawaii that makes it possible to secure the men these positions require every time there is a change of administration. One of the needs of the department is the establishment of adequate bacteriological laboratories on the different Islands.

SPECIAL PROBLEMS.

Camp Sanitation: The great sugar estates present most important sanitary problems on account of the collection in camps of large numbers of laborers. The term camp in this instance is rather misleading as it is usually understood to mean an aggregation of temporary shelters, but here it refers to the collections of relatively permanent structures, usually wood, in which the unskilled help of the plantation lives. The board of health has devoted particular attention to the problem of doing away with the old-fashioned type of barracks building that was used to house a large number of laborers and their families and has substituted cottages for individual families or for groups of four or five single men. Much progress has been made along these lines and on practically all plantations work is going forward, which will eventually make the camps in this respect entirely satisfactory from a sanitary point of view. A serious obstacle to all improvements is the indifference and even active antagonism of the very class of people that it is designed particularly to help—the laborers. The majority are Orientals (Japanese, Chinese, Koreans, Filipinos) and Porto Ricans. In general they are quite unwilling to do anything to help themselves and, indeed, they even refuse to avail themselves of the advantages given them; thus it is no uncommon thing to find all windows and doors of their houses tightly closed, and in some cases the trouble is taken to exlude light by pasting paper over the windows or hanging cloth over them. Evidently education is needed here about the value of ventilation and cleanliness.

The water supply of almost all of the camps is from artesian wells or mountain streams and is excellent in quality and abundant in quantity. The disposal of waste water is often very difficult. It is frequently used to irrigate sugar-cane fields. In a number of cases the camps are located on land so nearly level that it is difficult to dispose of the waste water.

The installation of well-made concrete drains will usually solve this problem. The disposal of human excreta is particularly difficult on many of the plantations. Dry earth closets and cess pools when used by the class of persons chiefly employed on the plantations rapidly become almost indescribably filthy. Through the efforts of the president of the board of health experiments are being made in the use of the Stiles tank. Just how satisfactory this will prove under the existing conditions is impossible to determine now. The only perfectly satisfactory solution of this problem would be to install adequate sewer systems carrying the waste matter to the sea. The principal difficulty would be the very great expense involved. On some of the plantations there are as many as twenty permanent camps and frequently they are so located that a separate sewer line would have to be carried from each one.

One of the most important of the special sanitary problems is the filling of swamp land in proximity to the larger communities. This is being carried forward at present.

A problem not common elsewhere is that of *wet agriculture.* Much of the land in Honolulu and in Hilo, the largest and second largest cities in the archipelago, is utilized for the growing of rice and taro, crops that require periodic or constant flooding of the land. The chief objection to this is that splendid opportunities are offered for the breeding of mosquitoes. In taro patches this can be obviated by keeping the ponds free from grass and weeds and stocking them with larvæ-destroying fish, but in the case of rice lands no effective solution is at hand. On account of the large investments in these industries it is impossible to abolish them at present.

The Sanitary Commission of Honolulu, an organization authorized by the Territorial Legislature and appointed by the Governor, recommended that a license be required for the growing of these crops and that the following conditions be enforced:

1. A description of the land, giving the area in square feet.
2. That the boundaries shall be at least 50 feet from any building.
3. That during the term of the license no building shall exist on the property described.
4. That the land shall not be used for human habitation or any other purpose than wet agriculture without securing a cancellation of the license, and without first abandoning the wet agriculture proposed.
5. Any violation shall, upon conviction, be heavily penalized.

Infectious Diseases: Diphtheria, scarlet fever, typhoid fever, and the other ordinary acute infections are met with from time to time and handled in a thoroughly approved fashion.

While it cannot be said that there are any prevailing diseases in the Islands in the usual acceptance of the term, there are certain special problems that merit consideration.

Cholera: The Islands have been visited by cholera on several occasions, the most recent being in the early part of 1911. By prompt and vigorous measures the disease was confined to Honolulu and suppressed with a total of thirty-nine cases, twenty-nine of which were fatal. The exact manner of introduction of the disease was not traced but there was strong evidence that it was propagated, at least in large part, through taro and poi.

Plague: Plague appeared first in 1899. Since then it has prevailed at one time or another on practically all of the Islands. There has been no difficulty in suppressing it save in Honolulu where it has reappeared from time to time up to about two years ago, and on the northern coast of Hawaii, the largest island of the group. Plague rats have been found frequently in the latter section during the past few years and at present the infection extends for perhaps twenty miles along the coast. The rodents that live in the sugar-cane fields are known to harbor the disease and it seems not unlikely that the problem of destroying them will be of the same nature but of less magnitude than the one presented in California in squirrel eradication on account of plague infection. It is believed that an adequate solution of the problem will not be reached until the work of rodent destruction is undertaken by the Territory and Nation jointly in the same manner as on the mainland. In this connection the fact should be mentioned that rodent extermination in Hawaii is a very much more difficult undertaking than in the United States. In Hawaii the large majority of the rats are *Mus rattus* and *Mus alexandrinus*, species that live in trees, under roofs, in stone fences, in rock piles, and in sugar-cane fields. These rodents are much harder to trap and poison than are the ordinary gray rats, *Mus norvegicus*, of temperate climates.

The rat campaign in Honolulu is under the direction of the United States Public Health Service, though the expense is born chiefly by the Territory.

Yellow Fever: This disease has been discovered at quarantine on several occasions and in November, 1911, a case occurred in Honolulu, the infection having been acquired on a steamer from Central and South American ports. Ample funds and the necessary authority being provided immediately, a comprehensive anti-mosquito campaign was carried on. No further cases occurred. The incident, however, led to measures for a continuance of a sufficient mosquito inspection force to keep Honolulu yellow fever proof.

While the *Stegomyia calopus*, the known yellow fever carrier, is sufficiently common in the Islands it is far exceeded in number by *S. scutellaris*, a closely related insect whose breeding places are less restricted than those of *S. calopus.* It is not known that *S. scutellaris* is a yellow fever carrier but judging by analogy it should at least be held under suspicion.

Fortunately, thus far, the Islands have *no malaria problem* as Anophelines are not found and appropriate measures have been taken to prevent their introduction.

Leprosy: For at least fifty years the Islands have carried a heavy economic, social, and financial burden in the scourge of leprosy. The policy of segregation has been carried out with more or less vigor since shortly after the presence of the disease was recognized. A few years ago a new law was enacted in which greater stress was laid upon treatment than upon segregation. This law is now working satisfactorily but it is doubted if it can solve the problem. Perhaps the greatest difficulty is in not seeing the cases in time to make an early diagnosis of the disease. Many of the afflicted ones who come under observation would pass muster anywhere in the ordinary intercourse of life as well persons. It is doubtful whether anything short of periodical physical examinations of the population will accomplish the desired end—early isolation of every leper. Although the utmost consideration is shown in dealing with these unfortunates and the most comfortable surroundings are provided for them there is a natural objection to having family ties broken and the patients isolated. That cases of leprosy are concealed long after the nature of the disease is known is admitted by all who are acquainted with the problem.

The writer is disposed to believe that if isolation was made somewhat less of a hardship by having a lazaretto on each island instead of sending all lepers to the settlement on the Island of Molokai, cases would be received sooner and the whole leprosy problem made easier of solution. There is a very general impression that the Island of Molokai is given over entirely for use as a leper colony while the fact is that only one small peninsula is so utilized. The isolation is perfect and on the whole the settlement is in every way excellently well suited for the purpose.

The scientific study of the disease is carried on at the United States Leprosy Investigation Station, which has laboratories both at Honolulu, where incipient cases come under observation, and at the Molokai settlement where the more advanced cases are to be found.

Conclusion: There has been some agitation in Honolulu looking to the transference of authority from the hands of the Territorial legislature to those of a commission directly representing the United States Government. This is held to be logical on account of the importance of the Islands, or at least of the Island of Oahu, as a naval base. It has been asserted by some that the Territorial legislature is incompetent and extravagant and that a government in which the responsibility was centered in officials appointed by the President would be better suited to the conditions that exist here which are admitted to be very different from those obtaining in the United States proper. The writer is, however, of the opinion that upon the whole the local government would not suffer greatly by comparison with those on the mainland. The health department certainly fares better than do those of most communities. I do not know that a sanitarian has any serious complaint to make of a legislative body that votes 20 per cent. of its total revenue to the health department. It can scarcely be regarded as lacking in interest in sanitary matters.

The writer is indebted to Dr. J. S. B. Pratt, president of the Territorial Board of Health, for much data employed in the preparation of this paper.

AN EPIDEMIOLOGIC SURVEY OF ALL TYPHOID FEVER CASES REPORTED TO THE CINCINNATI HEALTH DEPARTMENT DURING THE YEAR 1912.

WILLIAM H. PETERS, M. D.,
Chief Medical Inspector and Assistant Health Officer.

The principal object of the survey was to determine and eliminate the sources of infection; to ascertain as nearly as possible, the number of cases which must be credited to the various etiologic factors; to see what proportion of the cases might cast a suspicion upon the city water supply.

It was impossible to study all of the reported cases in clinical detail but we have been satisfied from clinical histories obtained and agglutination reactions that some of the cases were reported under mistaken diagnoses and should not have been placed on the records as cases of typhoid fever. On the other hand *we believe that many cases of typhoid fever were not reported in accordance with the state law for it is unreasonable to suppose that with the general mild character of the cases and the small number of deaths, the percentage of mortality should be so high.* From the standpoint of prophylaxis the unreported, and consequently uninvestigated, cases are of course of more importance than cases erroneously reported as typhoid fever.

One hundred and eighty-seven cases were investigated and the findings were as follows:

Typhoid fever	175
Other conditions	12

WIDAL.

	Positive.	Negative.	Not made.
Imported cases and temporary absence	50	4	12
Irregular water supplies	19	2	9
Personal contact	9	0	2
Premises not sewered	11	5	5
Mistaken diagnoses	0	8	4
Source of infection not established	24	8	15
Total	113	27	47
Per cent	60.4	14.4	25.2

For diagnostic purposes the Widal test was made in every instance where it was possible to obtain permission from the family physician and patient to puncture the ear.

In the study of our cases the following blank form was used and all facts called for by this form were carefully collected by Miss Body of the Visiting Nurses Association. I am indebted to her for the valuable assistance she has given; I am also under obligation to the doctors of the city for their coöperation and the information which they furnished.

Many of the specimens sent in by physicians were taken too early to give a positive reaction. We were in hopes that the doctors would send in a second specimen. These cases were not followed up by Miss Body for fear that our intentions might be misconstrued.

Age in years.		*Age in years.*	
0– 4	8	45–49	7
5– 9	20	50–54	2
10–14	29	55–59	0
15–19	32	60–64	2
20–24	34	65–69	0
25–29	17	70–75	1
30–34	14	Unknown	1
35–39	11		
40–44	9	Total	187

The youngest person affected was eighteen months old and the oldest, seventy-two years.

By decades, 28 of the persons reported were under ten years of age; 61 between ten and twenty; 51 between twenty and thirty; 25 between thirty and forty; 16 between forty and fifty, and 5 over fifty. In one instance we were unable to ascertain the age.

	Sex and Race.			
	Male.	Female.	Caucasian.	Ethiopian.
Imported cases and temporary absence	33	33	63	3
Irregular water supplies	21	9	30	0
Personal contact	6	5	11	0
Premises not sewered	12	9	21	0
Mistaken diagnoses	7	5	10	2*
Source of infection not established	21	26	45	2
Total	100	87	880	7

TABLE GIVING CASES AND DEATHS FROM TYPHOID FEVER IN CINCINNATI, OHIO.

From 1900 to 1912 (both inclusive).

	1900.		1901.		1902.		1903.		1904.		1905.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
January	17	3	114	29	96	16	103	18	388	49	98	15
February	13	3	47	14	80	19	96	26	117	31	67	13
March	23	7	28	13	114	16	71	15	69	20	74	20
April	14	13	28	12	49	21	54	17	46	18	48	12
May	11	5	31	11	36	11	48	6	65	15	48	12
June	13	6	47	7	51	10	43	6	94	20	46	9
July	9	6	36	16	81	13	49	10	256	33	60	12
August	51	14	82	13	104	22	64	7	200	16	46	14
September	25	11	48	12	152	17	32	6	87	17	55	13
October	45	8	59	14	73	23	25	6	97	13	55	7
November	40	10	54	7	91	16	33	9	109	15	38	9
December	261	33	155	32	111	22	132	18	118	23	111	19
Total	522	119	729	180	1,038	206	710	144	1,646	270	746	155

	1906.		1907.		1908.		1909.		1910.		1911.		1912.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
January	92	22	211	24	17	3	9	2	8	2	15	3	14	1
February	86	19	199	16	21	8	12	8	5	1	9	3	6	2
March	72	17	185	24	19	9	10	6	5	1	11	3	18	1
April	78	17	117	11	7	4	6	6	9	1	9	1	6	5
May	106	11	99	8	17	6	9	1	9	2	6	1	8	3
June	452	31	105	15	10	4	12	3	12	0	31	4	16	2
July	286	31	82	16	20	5	38	3	19	1	25	6	19	1
August	275	34	91	11	27	5	46	3	46	4	37	6	30	6
September	123	17	72	7	34	4	31	1	34	6	36	5	22	2
October	87	14	40	10	30	6	23	4	28	2	29	3	23	3
November	115	11	28	8	18	5	10	5	14	1	22	6	18	0
December	168	15	23	7	15	5	12	4	13	0	8	2	7	2
Total	1,922	239	1,252	157	235	64	218	46	202	21	238	43	187	28

Deducting the two cases that were reported under mistaken diagnoses only five cases occurred among Ethiopians and yet we have no reason to believe that colored people are immune.

PREVALENCE BY MONTHS.

Months.	Cases.	Deaths.
January	14	1
February	6	2
March	18	1
April	6	5
May	8	3
June	16	2
July	19	1
August	30	6
September	22	2
October	23	3
November	18	0
December	7	2
Total	187	28

GEOGRAPHIC DISTRIBUTION BY WARDS.

Ward.	*Cases.*	*Deaths.*	*Ward.*	*Cases.*	*Deaths.*
1	15	1	16	4	1
2	8	0	17	4	1
3	8	0	18	13	3
4	5	1	19	12	3
5	3	0	20	13	0
6	7	0	21	1	0
7	10	1	22	3	1
8	8	2	23	9	3
9	6	1	24	5	3
10	1	0	25	5	0
11	3	2	26	2	0
12	3	0	Public Institutions	24	3*
13	6	0			
14	5	0		—	—
15	4	1	Total	187	28

Mortality rate	14.6
Death-rate per 100,000 based upon the United Census Bureau Population, 387,543, July 1, 1912	7.23
Not including these two cases the average death-rate per 100,000 was	6.7

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*Two imported cases treated in the hospitals died.

It is interesting to note that those wards which are not adequately sewered contributed the greatest number of cases, viz., the 1st, 19th and 20th. The 19th ward in particular occupies an unenviable position, being just below the 20th ward, reaping the benefits of the hillside drainage.

The completion of Cincinnati's new sewer system will witness a very material decrease in the number of cases and deaths from typhoid fever.

IMPORTED CASES.

	Cases.	*Deaths.*
Imported cases who came from neighboring cities to our hospitals for treatment	17 9.1%	2 7.1%

TEMPORARY ABSENCE.

	Cases.	*Deaths.*
Patients who were temporarily absent from Cincinnati within 30 days prior to their illness*	49 26.2%	8 28.6%
Total	66 35.3%	10 35.7%

Imported Cases:

Ludlow and Newport	3
Bethel	2
Addyston	2
Reading	2
Other neighboring cities	8
Total	17

This classification does not include those individuals who were away from the city just for a day or two.

WATER SUPPLY.

	Cases.	*Deaths.*
Direct from river	8 4.3%	1 3.6%
Wells and cisterns	15 8. %	3 10.7%
Springs	7 3.7%	1 3.6%
Total number drinking from irregular water supplies	30 16. %	5 17.9%

Our experience shows that about two thirds of the samples taken from cisterns, wells and springs and submitted for bacteriologic examination were polluted, or to be accurate, of the 222 samples taken only 34.7 per cent. were free from contamination.

In addition to drinking water from cisterns and wells the presence of outdoor privy vaults was noted five times.

In two instances the outdoor privy vault was present as an etiologic factor where spring was used as a beverage. Three samples taken from three different springs, which were suspected as the source of infection, were found contaminated.

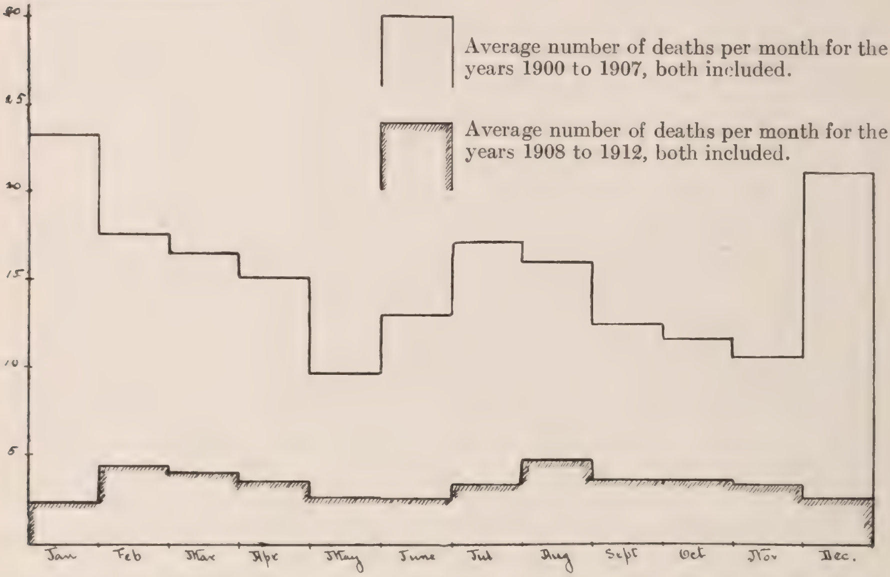


Chart showing the high winter prevalence of Typhoid Fever before the completion of the Water Works and Filtration Plant, October 1907, and subsequent reduction.

MILK SUPPLY.

During the year 1912 no cases of typhoid fever occurred in Cincinnati which were traceable to milk-borne infection.

PERSONAL CONTACT.

	Cases.	*Deaths.*
Associated 30 days prior to illness with patients in febrile stage	11	1
	5.9%	3.5%

OTHER FACTORS.

Cistern water Overflowing vault	6
Overflowing vaults	3
Contact only	2
	11

Most of our contact cases occurred among the attendants of patients and members of families in which a case of typhoid fever was treated. In some of our so-called contact cases the period of incubation between the first and second case was relatively short and in some cases not determined. The original source of infection may have been common for both cases.

DISPOSAL OF SEWAGE.

Cases reported from residences which were not connected with sewer:

		Cases.	*Deaths.*
Open privy vaults	19	21	4
Open gulley	2		
	21	11.2%	14.3%

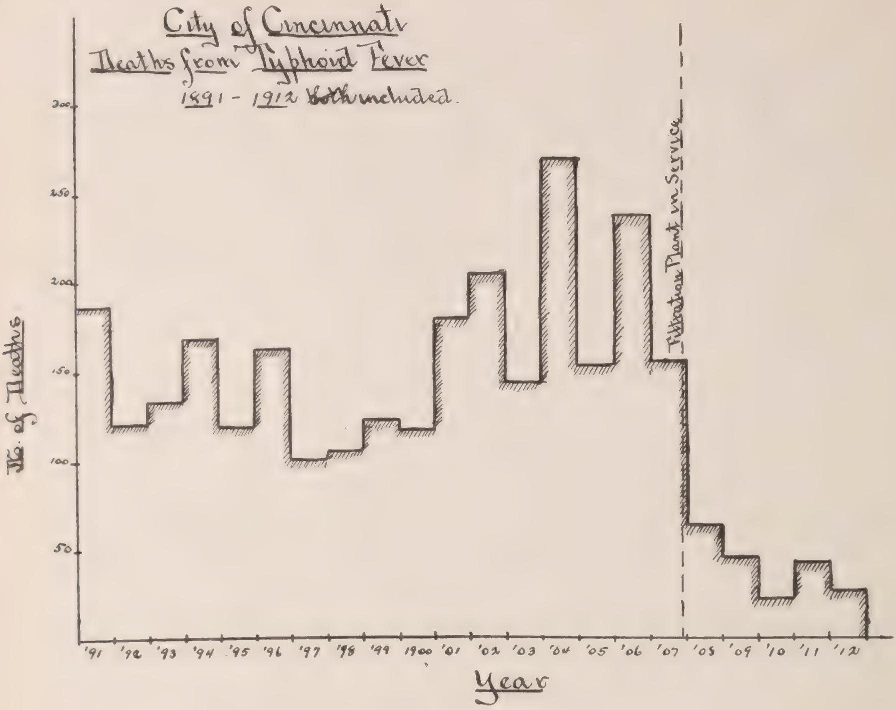
The waste waters from these premises were carried away in some instances; in other instances they were discharged through open drains or flushed through pipes into gulleys, vaults and cesspools or out onto the street.

The following table shows the disposal of body discharges from cases included in the various groups:

	Open Privy.	Open Lot.	River.	Flush Toilet.	Total.
Temporary absence	14	1	0	34	49
Irregular water supply	13	1	3	13	30
Personal contact	9	0	0	2	11
Premises not sewered	19	2	0	0	21
Total	55	4	3	49	111

A glance at this table shows the importance of installing flush toilets which are sewer connected. Among those who were temporarily absent from the city within thirty days prior to their illness, the presence of the outdoor privy vault was noted only fourteen times (or 70 per cent. lived in houses which were properly sewered), while in the other groups it was a rather constant factor.

The table undoubtedly casts a suspicion upon the open privy as the sponsor of polluted cisterns and wells. Outdoor privy vaults were noted in connection with cisterns and wells eleven times out of fifteen, or in 73 per cent. of the cases, a proportion which coincides fairly well with the number of samples found contaminated by bacteriologic examination.



MISTAKES IN DIAGNOSIS.

Of the 187 cases reported we feel quite certain that twelve were reported under mistaken diagnosis. The correct diagnosis which was ascertained upon investigation is given for each case as follows:

	Cases.	*Deaths.*
Obstruction of bowel	1	
Influenza	1	
Appendicitis	1	
Pneumonia	2	
Tuberculosis	1	
Minor gastro intestinal disorders	3	
Septico pyæmia and alveolar abscess	1	
Doubtful	2	
	12	
	6.4%	

The two doubtful cases were gastro intestinal disorders of more or less severity but not presenting the appearance nor running the clinical course of typhoid. The agglutination reaction with B. paratyphosus was positive.

DEATHS FROM TYPHOID IN THE FIFTY LARGEST CITIES OF THE UNITED STATES DURING THE YEAR 1912.

Location.	Population.	Deaths from Typhoid.	Av. Deaths per 100,000.	Rank.
New York, N. Y	5,064,237	500	9.87	15
Chicago, Ill	2,294,711	173	7.54	9
Philadelphia, Pa	1,606,102	223	13.88	25
St. Louis, Mo	712,027	74	10.39	18
Boston, Mass	711,128	57	8.01	10
Cleveland, Ohio	596,970	37	6.19	3
Baltimore, Md	569,560	136	23.88	39
Pittsburgh, Pa	550,667	70	12.71	21
Detroit, Mich	503,445	93	18.47	36
Buffalo, N. Y	439,666	37	8.42	11
San Francisco, Cal	433,488	61	14.07	27
Milwaukee, Wis	400,279	99	24.73	41
Cincinnati, Ohio	387,543	28	7.23	6‡
Los Angeles, Cal	386,014	53	13.73	24
Newark, N. J	369,317	26	7.04	4
New Orleans, La	350,695	49	13.98	26
Washington, D. C	342,776	78	22.75	38
Minneapolis, Minn	323,476	37	11.44	19
Jersey City, N. J	281,497	21	7.46	8
Seattle, Wash	277,420	20	7.21	5
Kansas City, Mo	265,977	34	12.78	22
Indianapolis, Ind	246,928	45	18.22	34
Providence, R. I	235,222	24	10.20	17
Portland, Ore	234,546	39	16.63	29
Rochester, N. Y	230,412	27	11.72	20
Denver, Colo	230,249	...	.....	..
Louisville, Ky	229,323	47	20.49	36
St. Paul, Minn	226,300	23	10.16	16
Columbus, Ohio	193,822	39	20.12	37
Toledo, Ohio	176,698	58	32.82	43
Oakland, Cal	167,401	16	9.56	14
Atlanta, Ga	167,040	59	35.32	45
Worcester, Mass	152,150	...	.....	..
Birmingham, Ala	150,249	56	37.27	46
Syracuse, N. Y	143,602	24	16.71	30
New Haven, Conn	139,325	34	24.40	40
Memphis, Tenn	137,467	77	56.01	47*
Scranton, Pa	135,894	12	8.83	12
Richmond, Va	131,453	22	16.74	31†
Paterson, N. J	130,167	6	4.60	2
Omaha, Neb	128,912	17	13.19	23
Fall River, Mass	122,52	22	17.96	33

DEATHS FROM TYPHOID IN THE FIFTY LARGEST CITIES OF THE UNITED STATES DURING THE YEAR 1912.—*Continued.*

Location.	Population.	Deaths from Typhoid.	Av. Deaths per 100,000.	Rank.
Spokane, Wash	120,994	20	16.53	28
Dayton, Ohio	120,364	22	18.27	35
Grand Rapids, Mich	118,163	40	33.85	44
Nashville, Tenn	112,744	36	31.93	42
Bridgeport, Conn	108,999	8	7.34	7
Lowell, Mass	108,759	10	9.19	13
Cambridge, Mass	107,734	3	2.78	1
Albany, N. Y	101,724	18	17.6	32

*Exceptional, owing to overflow of river.

†*Six* cases contracted outside of Richmond.

‡Two cases imported; died in Cincinnati hospitals.

while with B. typhosus clumping was slow, many bacilli remaining sluggishly motile.

Source of Infection not Established.

Individuals who drank tap water and who were not absent from the city nor associated with patients in the febrile stage within thirty days prior to their illness and who lived in houses which were sewer connected:

Cases.	*Deaths.*
47	8
25.2%	28.5%

After prolonged and careful studies a fairly large number of cases have been left unaccounted for and are included in the above group. However, the experience of other investigators teaches us that other factors which have not been mentioned play an important rôle in the etiology of typhoid fever.

Many patients in this group gave a history of eating raw vegetables and fruits. Not unfrequently the farmer uses as a fertilizer night soil which has not been properly sterilized. Lettuce, celery, radishes, strawberries might be easily infected in this manner or by an infectious individual over whom we have no control.

Previous researches have demonstrated conclusively that the fly must assume an important rôle as a disseminator of typhoid fever. We may assume that the infection may be spread by insects, cats and other animals. The information which we got as to screening was very unsatisfactory except in those cases in which the premises were not screened at all.

A history of eating raw oysters and shell-fish obtained was in a small percentage of these cases. This information was also obtained in some cases included in other groups but not considered as a primary factor because a more important one prevailed.

In some instances parents were inclined to cast suspicion upon ice cream purchased from street vendors.

With our present knowledge "bacillus carriers" constitute a very important factor in the spread of typhoid fever. When we consider the large number of cases which came down years ago before the completion of the new water works it is difficult to understand why typhoid is not more prevalent in Cincinnati. Maybe the organisms have become attenuated or avirulent.

SUMMARY.

	Cases.	Per Cent.	Deaths.	Per Cent.
Imported cases and temporary absence	66	35.3	10	35.7
Irregular water supplies	30	16.0	5	18.
Personal contact	11	5.9	1	3.5
Premises not sewered	21	11.2	4	14.3
Mistaken diagnosis	12	6.4		
Source of infection not established	47	25.2	8	28.5
Total	187	100	28	100

RELATION OF PURITY OF WATER SUPPLY TO TYPHOID FEVER.

J. W. Ellms,

Superintendent Filtration Plant, Cincinnati, Ohio.

A polluted water supply has always been recognized as a carrier of disease. This fact has been so repeatedly demonstrated in the case of typhoid fever that it would seem almost unnecessary to call attention to it again. But Cincinnati has made such a remarkable record in reducing typhoid fever by changing from an impure to a purified water supply that the truth of the adage that "an ounce of prevention is worth a pound of cure," has more force than ever before.

For the three years preceding the introduction of a purified water supply, Cincinnati's typhoid death-rate averaged 53 per hundred thousand of population. For the five years following the purification of the water supply, the death-rates per hundred thousand were 19, 13, 5.7, 11.4, and 7.1, respectively. This represents an average reduction in the number of deaths from this disease of nearly 80 per cent. The reduction in the cases reported is very nearly 85 per cent. when estimated for this same period. Whether other sanitary reforms approximately coincident with the purification of the water supply have not played some part in the diminution of cases from this disease, the writer is not prepared to say; but there is little doubt that the principal agency has been the substitution of a pure for an impure drinking water.

The variation in the typhoid death-rate since the water supply has been purified is of interest, especially as the general downward tendency in the number of deaths from the time purification was begun in 1908, reached its minimum in 1910, only to be doubled in the year 1911, and to fall again in 1912. The question naturally arises as to whether these fluctuations are in any way related to variations in the hygienic quality of the now purified water, or to sources of infection entirely unrelated to the water supply.

The following table includes for the four years, 1909 to 1912, both inclusive, summaries of certain bacterial data obtained in the examination of the unpurified Ohio River water, and the purified water supplied to the city. The fluctuations in the typhoid fever death-rate are also noted for purposes of comparison. Calcium hypochlorite was not applied to the filtered water as a disinfecting agent in either 1909 or 1910, but was used for the first three months of 1911, and for the first six and one-half months of 1912.

A careful study of this table with a view to establishing some relation between the fluctuations in the typhoid death-rate and the quality of the water does not lead to any very positive conclusions. It immediately raises a question as to whether we really obtain any direct measure of the purity of a water in the usual bacterial examinations which are made. So far as the total number of organisms removed is concerned these results

COMPARISON OF THE TYPHOID FEVER DEATH-RATE WITH THE HYGIENIC QUALITY OF THE WATER SUPPLY OF CINCINNATI.

For the year	1909.	1910.	1911.	1912.
Typhoid fever death-rate per 100,000 of population	13	5.7	11.4	7.1
Percentage reduction from average death-rate for three years preceding introduction of filtered water supply	75	90	79	89
Average number of bacteria per c.c.:				
In river water	9300	8900	13790	11130
In filtered water	75	75	39	26
Percentage reduction of bacteria by purification	99.2	99.2	99.7	99.8
Yearly percentages of presumptive positive B. Coli results obtained in various amounts of the river and filtered water:				
In river water in 1 c.c.	93.2	91.0	85.3	93.5
In filtered water in 1 c.c.	1.0*	7.9*	5.2†	3.0‡
In filtered water in 100 c.c.	66.0*	65.0*	84.3†	51.6‡
Percentages of presumptive positive. B. Coli results in 100 c.c. of filtered water for the period of disinfection:				
Before disinfecting filtered water	—	—	88.9	89.3
After disinfecting filtered water	—	—	12.8	27.7

* No sterilizing agent used.

† Disinfection with calcium hypochlorite for first three months of 1911.

‡ Disinfection with calcium hypochlorite for first six and one-half months of 1912.

indicate a water of high purity. On the other hand the presence of fecal or gas producing organisms likely to be associated with the typhoid bacillus, as shown by the presumptive positive B. coli figures, would lead one to believe that the entire absence of these organisms in a water is by no means absolutely necessary as an indication of what experience has shown to be a safe drinking water. The reduction in the number of B. coli effected by filtration alone is evidently in the same proportion as that obtained in the reduction of the total number of bacteria. No selective action takes place in filtration, although there appears to be some such action when the disinfecting agent, calcium hypochlorite, is used.

So long as bacteriology is unable to furnish reliable and rapid methods for the isolation of pathogenic organisms in water, it will be necessary to rely on circumstantial evidence, such as has been furnished by the remarkable reduction of typhoid fever in Cincinnati, following the introduction of a purified drinking water. Since all those cases, in which the source of the infection remains untraced, may have been infected through agencies such as flies, shell-fish, raw vegetables, fruits and bacillus carriers, it reduces the probability of our present purified drinking water being a source of infection to practically zero.

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WILLIAM CRAWFORD GORGAS.

Mosquitoes and malaria: oil tanks and drainage ditches; dispensaries› hospitals, and sanitary squads; these we have come to associate instinctively with the sanitation of the Canal Zone. But all of these are mere symbols—symbols of the all-pervading influence of Manson, of Ross, of Finlay, of Carter, and Lazear, and Carroll, and Reed, who made the Canal a possibility, and of him who has organized and executed the work foreshadowed by their coming—William Crawford Gorgas.

They say blood will tell, and it did tell in the case of Gorgas. His grandfather was one time governor of the state of Alabama, and his father was one of those brave idealists who, graduated by the West Point Military Academy, without a murmur sacrificed his commission in the army when conscience told him that his first duty was to the state that had nurtured him — and to the Confederacy. Gorgas himself is a child of the South, of a period when "yellow fever" was still a term to strike terror to the hearts of all. To the University of the South he owes his academic education, and the Bellevue Hospital Medical College claims the distinction of having graduated him as a doctor of medicine. He walked the wards of old Bellevue; and then came the army—and Florida, Dakota, Texas, and wherever else a soldier's life might lead; but always as he moved from place to place a host of grateful patients and loving friends were left behind. For Gorgas is above all things else a friendly man. No finer evidence of this capacity for friendship can be found than in the love and esteem in which he is held by the people of Havana, acquired in some inconceivable way even while he was engaged in the very duty of enforcing with military precision and firmness the sometimes harsh requirements of the sanitary code.

But if a capacity for friendship is one of his characteristics, modesty is another not less marked. The unassuming dignity with which he entered upon the task of making the Canal Zone habitable is a lesson for all. Here again his wonderful patience and tact, and his good judgment and knowledge of men, served him and his country in good stead. For, arriving at the Zone in the very first vessel that carried the officers who were to build the Canal, he has kept placidly on his way in the discharge of his duty, unruffled by the rumblings and misunderstandings about him, until he is today the only one of the chief officials first assigned to the task, who has remained to finish the whole duty assigned to him.

Duty well done—a supreme ever-animating ideal in a soldier's heart, and brain, and body. Uncomplaining and loyal acceptance of the allotted task. Unceasing and untiring effort toward the accomplishment of the end sought. These, in William Crawford Gorgas, have made the Panama Canal possible—for these are the things that have made it possible for every one, even for the chief engineer and down to the humblest laborer in the trenches, to live in health and safety on the Isthmus. No wonder, then, that South Africa should appeal for Gorgas' help.

THE JOURNAL IN 1913.

The year 1913 has witnessed a gratifying increase in the number of subscribers to the JOURNAL, indicating that the JOURNAL is serving a useful purpose. The volume concluded with this issue shows an increase of 38 per cent. in the number of pages as compared with 1912. There has been an increase in practically all departments, particularly in those sections devoted to notes and reviews. Further improvements are planned for the future.

It is evident that there are many persons who do not now see the JOURNAL who would derive an actual benefit from it. The subscribers are in a position to perform a signal service by each getting one new subscriber. The doubling of our circulation would go a long way towards making the JOURNAL self supporting. Do you believe sufficiently in the JOURNAL to aid in this practical manner?

Your help in this important matter is earnestly solicited.

A STUDY OF THE HYGIENIC CONDITION OF THE AIR IN CERTAIN TEXTILE MILLS WITH REFERENCE TO THE INFLUENCE OF ARTIFICIAL HUMIDIFICATION.

H. W. Clark and Stephen DeM. Gage.

Read before the Sanitary Engineering Section, American Public Health Association, Washington, D. C., 1912.

(*Concluded from November.*)

Condition of the Air in Spinning and Weaving Departments of Certain Cotton and Woolen Mills.

As has already been stated, the principal object of the investigation was to obtain data upon the condition of the air in weaving and spinning rooms, since these were the rooms to which the Massachusetts law particularly applied. The processes of spinning the cotton or wool fibers into yarn and weaving that yarn into cloth are generally understood, and description of them here is unnecessary. In both processes a more or less careful control of the atmospheric conditions is considered necessary in order to obtain the best results, especially in the manufacture of the finer grades of goods, and many of the rooms which were examined were equipped with apparatus for increasing or controlling the humidity.

Spinning Rooms: Twelve spinning rooms in three different cotton mills and two different woolen mills were investigated. In the cotton mills only ring spinning was found, four of the rooms examined being equipped with humidifiers, while four others had no humidifiers in operation. Although artificial humidification is supposed to increase the moisture content of the air and to lower the temperature to some extent, the humidity was not appreciably greater in the rooms which were equipped with humidifiers, while those containing no humidifiers were generally somewhat cooler. In the four rooms containing humidifiers the dry bulb temperature ranged from 76° to 81° F., the wet bulb temperature from 45° to 63° F., and the relative humidity from 29 to 59 per cent. In the four rooms without humidifiers the actual temperature varied from 68° to 79° F., the sensible temperature from 54° to 63° F. and the relative humidity from 27 to 46 per cent. Although the temperature of six of these eight spinning rooms was above 75° F. and of two of them was above 80° F., the sensible or wet bulb temperature was in all cases below 70° F.

In the woolen mills, two English or cap spinning rooms and two French or mule spinning rooms were examined. In the English spinning rooms the dry bulb temperature ranged from 72° to 86° F., the wet bulb temperature from 57° to 65° F., and the relative humidity from 21 to 42 per cent. Neither of these rooms contained humidifiers. In French spinning a much greater amount of moisture is said to be required in the air than in the English process and both French spinning rooms which were examined were equipped with humidifiers. In these two rooms the actual temperature ranged from 76° to 87° F., the sensible temperature from 73° to 82° F., and the relative humidity from 65 to 92 per cent. While the actual temperature of these French spinning rooms was very little higher than that in many of the other spinning rooms, the sensible temperature was very much higher owing to the increased humidity, and the rooms felt very hot and stuffy. According to the superintendent of one of these rooms, the humidity was not supposed to fall below 65 per cent., while the superintendent of the other mule spinning room stated that the normal humidity which he attempted to maintain was about 72 per cent. and provision was made for blowing steam into the air if the artificial humidifiers failed to produce the required effect. In the former of these rooms the average sensible temperature was 74° F., while in the latter nearly all of the wet bulb thermometer readings were above 75° F. and many readings were above 80° F., or considerably above the "comfort point."

The numbers of room temperature bacteria in the air of the cotton spinning rooms ranged from 600 to 8,200 per cubic meter, and the numbers of bacteria of the body temperature types ranged from less than 200 to about 15,000 per cubic meter. On the exposed plates, the room temperature counts varied from 3 to over 500 and the body temperature counts varied from 4 to 350. The average number of both room temperature and body temperature bacteria were much higher in those rooms which were equipped with humidifiers than in those containing no humidifiers, although the reverse was true in the case of counts on the exposed plates. Fermenting organisms were found in five liters of air in about two thirds of the samples from rooms which contained no humidifiers and in about 30 per cent. of the samples from the rooms in which air moisteners were in operation, while B. coli were found in about 17 per cent. of the samples from the former but were not found in the latter class of rooms.

The bacterial content of the air of the English spinning rooms in the woolen mills was much lower than in similar rooms in the cotton mills, the largest number of bacteria found in any sample from an English spinning room being about 600 per cubic meter, and a considerable proportion of the samples contained less than 200 bacteria per cubic meter. In one of the rooms where wool was being spun on mules also the bacterial content of the air was very low, but in the other French spinning room extremely high numbers of body temperature bacteria were obtained on all samples collected by the sand filter method, although the counts upon the exposed plates were low in all cases. The probable reason for the high bacterial counts in the mule spinning room in this mill and also in the ring spinning rooms in certain of the cotton mills will be discussed in a subsequent chapter. No fermenting organisms were found in the air of any of these wool spinning rooms.

TABLE II.

AVERAGE RESULTS OF EXAMINATION OF AIR IN SPINNING ROOMS.

Mill.	Room.	Temperature. (Degrees F.)		Relative Humidity.	In One Cubic Meter.				Plates Exposed 15 Minutes.			
					Bacteria.			Moulds.	Bacteria.			Moulds.
						40° C.				40° C.		
		Dry Bulb.	Wet Bulb.		20°C.	Total.	Red.		20°C.	Total.	Red.	
Cotton Spinning Rooms Containing Humidifiers.												
B......	1	80	62	30	4,200	1,500	175	300	47	13	1	1
B......	2	77	64	49	2,200	750	100	500	11	26	0	1
C......	3	84	60	31	900	12,500	10,700	150	30	31	7	0
D	4	84	64	32	6,900	3,800	2,600	100	430	170	55	3
Average ..	—	81	63	37	3,550	4,600	3,400	260	130	60	16	1
Maximum	—	87	66	59	8,200	15,000	12,400	800	520	250	100	4
Minimum	—	76	45	29	600	*	*	*	3	4	0	0
Cotton Spinning Rooms Without Humidifiers.												
B......	5	79	60	31	1,800	1,200	100	400	275	10	0	3
C......	6	76	58	31	2,200	900	150	250	320	110	13	1
C......	7	70	57	37	1,500	500	350	2,200	16	270	260	1
D......	8	72	58	42	4,400	2,000	800	400	300	70	32	0
Average ..	—	74	58	35	2,500	1,150	350	810	230	115	76	1
Maximum.	—	79	63	46	4,400	2,000	800	2,800	450	350	340	3
Minimum .	—	68	54	27	1,000	400	*	*	12	10	0	0
Wool (French) Spinning Rooms Containing Humidifiers.												
E......	9	81	74	74	4,100	31,800	25,300	125	6	5	1	0
F......	10	84	79	81	575	125	125	175	2	2	0	1
Average ..	—	82	77	78	2,300	16,000	12,700	150	4	4	1	1
Maximum.	—	87	82	92	15,600	36,400	30,400	200	15	7	2	1
Minimum	—	76	73	65	*	*	*	*	0	1	0	0
Wool (English) Spinning Rooms Without Humidifiers.												
E......	11	72	58	40	100	100	100	150	5	33	8	1
E......	12	83	61	26	400	150	150	150	23	20	15	2
Average ..	—	78	60	33	250	125	125	150	14	26	11	2
Maximum.	—	86	65	42	600	200	200	200	26	63	30	3
Minimum	—	72	57	21	*	*	*	*	3	1	0	0

Fermenting organisms found in some samples of air from rooms 2, 4, 6, 7 and 8.
No B. coli were found in any of the samples.
All maximum and minimum results based on individual determinations.
* = less than 200.
All humidifiers of spray type. Room 10, Mill F, also equipped with auxiliary steam jets.

The average results of the examination of the air in these various spinning rooms are shown in Table II.

Weave Rooms: The air conditions in fifteen different weave rooms were investigated, thirteen of the rooms being distributed in four different cotton mills and two being located in a woolen mill. In six of the cotton weave rooms no humidifiers were in operation, five contained humidifiers of the spray type and two were equipped with humidifiers of the cloth filter type. In the rooms containing humidifiers, the dry bulb temperature ranged from 62° to 89° F., the wet bulb temperature from 49° to 73° F., and the relative humidity from 32 to 64 per cent. In six of these rooms the average dry bulb temperature was over 75° F. and in two the average was over 80° F. In only one of these rooms was the average wet bulb or sensible temperature higher than 70° F., although in one other room (No. 14) a wet bulb temperature above 70° F. was found in a few places. Both of these rooms were equipped with humidifiers of the cloth filter type. In the six cotton weave rooms which did not contain humidifiers the air temperature ranged from 57° to 83° F., the wet bulb temperature from 45° to 65° F., and the relative humidity from 31 to 69 per cent. In four of these rooms the dry bulb temperature averaged above 75° F., and in two the average temperature was above 80° F., but in no case were wet bulb temperatures as high as 70° F. found in any of these rooms. There was considerable variation in the temperature and humidity even in the rooms in which artificial humidification was practised, differences of 8 to 10 degrees in temperature and of 20 to 25 per cent. in humidity being frequently observed in different parts of the same room. Both of the two wool weave rooms examined were in the same mill, neither being equipped with humidifiers. The range of both temperature and humidity in these rooms was very slight, the average dry and wet bulb temperatures being 77° and 59° F. respectively, and the average humidity about 31 per cent.

There was a wide difference in the bacterial content of the air of the various cotton weave rooms. In two rooms which were equipped with humidifiers of the cloth type, the number of room temperature bacteria averaged 12,000 and 6,800 per cubic meter and the types of bacteria growing at body temperature averaged 1,500 and 2,400, respectively. In another room in the same mill which contained no humidifiers the room temperature bacteria averaged over 88,000 and the body temperature bacteria nearly 13,000 per cubic meter. The air of the rooms which contained humidifiers of the spray type almost without exception contained many more bacteria of all types, and also more moulds, than in the rooms in the same mills which were not equipped with humidifiers. The numbers of bacteria in the air of four of the five rooms which were equipped with this type of humidifier averaged over 5,000 per cubic meter, while in the same mills two of the rooms where there was no artificial humidification showed room temperature counts by the sand filter method of only 400 bacteria per cubic meter, and in only one room was a count of over 5,000, per cubic meter obtained. Fermenting bacteria were found in five liters of air in about 21 per cent. of the samples collected from rooms containing humidifiers and in about 46 per cent. of the samples from rooms without humidifiers, and

TABLE III.

AVERAGE RESULTS OF EXAMINATION OF AIR IN WEAVING ROOMS.

Mill.	Room.	Temperature. (Degrees F.)		Relative Humidity.	In One Cubic Meter.				Plates Exposed 15 Minutes.			
					Bacteria.			Moulds.	Bacteria.			Moulds.
						40° C.				40° C.		
		Dry Bulb.	Wet Bulb.		20° C.	Total.	Red.		20° C.	Total.	Red.	
Cotton Weave Rooms Containing Humidifiers.												
A......	13	84	71	49	12,000	1,500	700	220	46	17	5	0
A......	14	82	67	47	6,800	2,400	870	550	250	61	13	1
B......	15	77	64	49	5,450	1,800	525	550	14	10	0	0
B......	16	78	66	52	6,550	23,500	18,700	425	250	11	0	0
C......	17	76	63	47	2,500	2,500	1,400	1,600	19	61	33	0
C......	18	78	63	43	5,100	4,700	1,600	470	29	19	4	0
D......	19	66	52	37	9,100	6,700	1,330	870	460	25	10	0
Average ..	—	77	64	46	6,800	6,200	3,600	670	152	29	9	0
Maximum.	—	89	73	64	12,400	72,000	61,000	2,000	990	210	40	5
Minimum	—	62	49	32	1,400	200	*	*	6	4	0	0
Cotton Weave Rooms Without Humidifiers.												
A......	20	76	64	55	88,500	12,800	4,000	950	870	900	44	0
C......	21	81	64	38	4,200	1,400	200	100	28	10	2	0
C......	22	81	63	36	400	1,000	300	350	8	8	3	1
C......	23	76	59	36	2,000	530	200	200	28	10	0	0
D......	24	57	45	35	400	800	400	100	150	10	4	0
D......	25	65	50	35	9,100	10,100	4,800	200	112	25	4	0
Average ..	—	72	58	39	17,400	4,400	1,650	317	200	160	9	0
Maximum.	—	83	65	69	188,000	20,400	6,600	3,400	1,450	3,025	77	2
Minimum	—	57	45	31	200	200	*	*	3	3	0	0
Wool Weave Rooms Without Humidifiers.												
E......	26	75	57	31	200	800	100	100	12	5	0	0
E......	27	79	60	31	200	200	100	400	62	8	2	0
Average ..	—	77	59	31	200	500	100	250	37	7	1	0

Fermenting organisms found in some samples of air from weave rooms 13, 14, 15, 18, 19, 20 and 25.

B. coli found in some samples of air from rooms 19 and 20.

All maximum and minimum results based on individual determinations.

* = less than 200.

Humidifiers in Mill A (Rooms 13 and 14) of cloth filter type.

Humidifiers in Mills B, C and D (Rooms 15 to 19 incl.) of spray type.

B. coli were found in about 7 per cent. of the samples from each of these two classes of rooms.

In the two wool weave rooms the numbers of bacteria in the air were very low, the highest count obtained being only 800 per cubic meter. No fermenting organisms were found in any of the samples from either of these rooms.

The average results of the examination of the air in these various weave rooms are shown in Table III.

AIR CONDITIONS IN PICKER AND CARDING ROOMS.

So far as the amount of dust in the air is concerned, the rooms where the picker and carding processes are in operation probably represent the worst conditions to be found in the textile industry.

Picker Rooms: In the picker room, heavy machinery opens up the masses of cotton or wool fibers, mixes it, and beats it to remove the dirt. The best results are accomplished if the fibers are dry, and the humidity is usually kept as low as possible. Most picker machines are equipped with exhaust fans to draw away the dirt, but a large amount of dust and fly escapes into the air in cotton picker rooms. Wool is usually scoured or washed before being put through the picker, and the air conditions in this department are usually much better in woolen than in cotton mills. In the two cotton picker rooms examined the range in temperature was from 65° to 72° F. and in humidity was from 32 to 42 per cent. In one of these rooms the total number of bacteria near the intake of the picker machine averaged over 23,000, and at the outtake of the machine over 11,000 per cubic meter, and the bacteria growing at body temperature averaged 8,800 and 1,800, respectively. There were large numbers of moulds in the air in this room, and fermenting organisms were found in many of the samples. On plates exposed for fifteen minutes the counts averaged about 600 when incubated at room temperature and about 100 when incubated at body temperature. In the other cotton picker room the total numbers of bacteria obtained from one cubic meter of air averaged about 12,000 at the intake and about 95,000 at the outtake of the machine. The numbers of bacteria developing at body temperature in this room varied from 200 to over 9,000 per cubic meter, and the number of moulds averaged 600 per cubic meter. Plates exposed fifteen minutes in this room showed counts ranging from 500 to over 3,000 after incubation at room temperature and from 15 to over 700 after incubation at body temperature. Although fermenting organisms were isolated from five liters of air in every sample collected in this room, in no case were bacteria of the colon type isolated. It is interesting to note, however, that the proportion of bacteria producing red colonies on litmus-lactose agar plates was extremely low in both of these cotton picker rooms. In the one wool picker room examined, the temperature averaged about 66° F. and the humidity about 45 per cent. The total number of bacteria in the air of this room averaged about 4,600 per cubic meter, and the average body temperature count was less than 200 per cubic meter. The numbers of colonies developing on exposed plates were also much lower than in the rooms where cotton was being manipulated, the average room temperature count being about 35 and the average body temperature count being about 80. The number of moulds in the air of this room was also very low, and fermenting bacteria were not isolated from any of the samples.

Carding Rooms: In the carding machines the stock which has been freed from coarse dirt and partly opened up by the pickers is further manipulated by toothed rolls until it is entirely free from dirt and lumps and is in a free and open condition with each fiber free and separate. In cotton carding rooms the air is generally filled with dust and fly, but as the wool is free from dirt when it comes to the cards and as oil is added to the stock in the carding process to replace the natural lubricant which was removed by scouring the atmospheric conditions in the wool carding rooms are far less objectionable.

The carding rooms in two cotton mills and one woolen mill were examined. In carding wool, the work is said to run better when the humidity is relatively high, and the wool carding room examined was equipped with humidifiers of the spray type. In this room the temperature ranged between 68° and 75° F., and the relative humidity between 47 and 100 per cent. Although the average sensible temperature in this room was only 63° F., a number of wet bulb readings of 70° F. or over were obtained and the records kept by the superintendent show that there are many days when the sensible temperature does not fall below 70° F. The average bacterial content of the air varied from 200 to 1,600 per cubic meter as shown by room temperature plates, and from 600 to 2,200 as shown by body temperature plates. On plates exposed for fifteen minutes from 30 to 210 colonies developed after incubation at room temperature and from 60 to 170 after incubation at body temperature. Fermenting organisms were not found in any of the samples and the numbers of moulds were relatively low. In the carding of cotton, it is attempted to maintain a relatively low humidity as any excess of moisture tends to make the cotton fibers stick to the rolls. The air in both of the cotton card rooms investigated was full of dust and fly, although less so than that of the picker rooms. In one of these rooms, no artificial humidification was employed, while the other was equipped both with spray moisteners and with steam drums, the latter being in use at the time the examination was made. The physical condition of the air in both of these rooms were practically the same, the temperature ranging between 74° and 82° F. and the humidity between 27 and 33 per cent. In one of these rooms the average bacterial content of the air was over 12,000 per cubic meter as shown by room temperature counts and over 45,000 as shown by body temperature counts. About two thirds of the bacteria developing on the litmus-lactose agar plates produced red colonies. Organisms fermenting dextrose were not found, however, in any of the samples. The average number of bacteria developing on exposed plates was about 2,200 after incubation at room temperature and about 750 after incubation at body temperature. In the cotton carding room in which there was no artificial humidification the total numbers of bacteria averaged over 200,000 per cubic meter, and the numbers developing at body temperature averaged about 18,000. On plates exposed for fifteen minutes in this room large numbers of bacteria developed after incubation at both temperatures, the numbers being so great in the majority of cases that they could not be estimated with any degree of accuracy. Moulds were present in the air of this room in considerable numbers, and fermenting organisms were found in the majority of five-liter samples examined.

TABLE IV.

AVERAGE RESULTS OF EXAMINATION OF AIR IN PICKER AND CARDING ROOMS.

Mill.	Stock.	Temperature. (Degrees F.)		Relative Humidity.	In One Cubic Meter.				Plates Exposed 15 Minutes.			
					Bacteria.			Moulds.	Bacteria.			Moulds.
					20° C.	40° C.			20° C.	40° C.		
		Dry Bulb.	Wet Bulb.			Total.	Red.			Total.	Red.	
Picker Rooms.												
C...	Cotton	72	57	42	17,200	5,300	100	1,200	595	95	10	5
D...	Cotton	67	52	32	54,000	4,700	1,500	600	1,800	370	1	0
E...	Wool	66	54	45	4,600	200	100	100	35	80	40	0
Carding Rooms.												
C...	Cotton	81	60	27	12,800	45,400	31,800	100	2,200	760	0	0
D...	Cotton	76	58	30	230,000	18,000	100	300	(Too many to count.)			
F...	Wool	74	63	77	1,000	1,000	600	500	100	95	20	2

Fermenting organisms found in some samples of air from the picker rooms in both cotton mills and the carding room in cotton Mill D.

No B. coli found in any of the samples.

Spray humidifiers in carding room in Mill F and steam drums in carding room in Mill D. No humidifiers in other rooms.

The average results of the examination of the air in these various picker and carding rooms are shown in Table IV.

AIR CONDITIONS IN CERTAIN OTHER WOOL MANUFACTURING PROCESSES.

In addition to the investigation of conditions in the various textile processes previously discussed, examinations were also made in rooms in which fourteen other processes were in operation. Certain of these processes are common to both cotton and wool working, while certain others are commonly employed only in woolen or worsted manufacture. At the time the investigation was made business in the textile industry was at a low stage and most of the rooms which were being operated to their full capacity were relatively small, and in many cases were not equipped with humidifiers, although artificial humidification is often employed in certain of these processes elsewhere. For these reasons, the number of determinations which were made in most of these rooms were sufficient only to give a fairly representative idea of the air condition surrounding the various processes. The average results of examinations of the air in rooms where these various processes were in operation are shown in Table V.

Wool Sorting: In the sorting room the bales of wool are opened, sorted into different grades, and those grades mixed in the proper proportions for the kind of cloth into which it is to be made. The wool as received contains the natural wool grease and a large amount of dirt and foreign matter. It is necessary to maintain a high temperature in the sorting room to soften the grease in order that the fleece may be readily pulled apart, and, as much dirt sifts out in the sorting process, the air is usually very dusty. The room examined was not equipped with humidifiers, and the humidity of the air was relatively low, the dry bulb temperature being about 80° F., the wet bulb temperature being about 62° F., and the relative humidity about 35 per cent. The bacterial content of the air in this room was considerably higher than in any of the other rooms in either of the woolen mills although not as high as in certain departments in the cotton mills. The total number of bacteria averaged over 11,000 per cubic meter, and the body temperature bacteria averaged about 1,000 per cubic meter. The number of moulds found in the air was also high, averaging 2,400 per cubic meter. On plates exposed for fifteen minutes about 280 colonies developed after incubation at room temperature and about 50 after incubation at body temperature.

Combing: In the manufacture of worsteds the carded stock is passed through machines which comb it to remove the short fibers or noils and to lay the longer fibers smooth and nearly parallel. Three combing rooms in two different mills were examined. In one of these which was equipped with humidifiers of the spray type the dry bulb temperature ranged from 65° to 77° F., the wet bulb temperature from 56° to 66° F. and the relative humidity from 49 to 57 per cent. No bacterial examinations were made in this room. In the other two combing rooms, neither of which contained humidifiers, the dry bulb temperature varied from 75° to 79° F., the wet bulb temperature from from 57° to 59° F., and the relative humidity from 25 to 29 per cent. The average bacterial content of the air as determined by the sand filter method was about 100 per cubic meter in one of these rooms and about 1,400 per cubic meter in the other. The numbers of bacteria developing on exposed plates were similar in both rooms, the average being 17 and 6 respectively.

TABLE V.

AVERAGE RESULTS OF EXAMINATIONS OF AIR IN ROOMS WHERE VARIOUS OTHER WORSTED MANUFACTURING PROCESSES WERE IN OPERATION.

Process.	Temperature. (Degrees F.)		Relative Humidity.	In One Cubic Meter.				Plates Exposed 15 Minutes.			
				Bacteria.			Moulds.	Bacteria.			Moulds.
	Dry Bulb.	Wet Bulb.		20° C.	40° C.			20° C.	40° C.		
					Total.	Red.			Total.	Red.	
Wool sorting	80	62	35	11,200	1,000	200	2,400	280	50	0	2
Combing	78	58	27	750	150	100	100	12	7	2	0
English drawing	77	64	60	1,300	1,000	500	250	3	11	8	0
French drawing	76	67	63	100	400	150	100	5	9	2	0
Twisting	69	56	43	400	100	100	100	4	2	1	2
Beaming and winding	77	60	36	600	200	100	200	20	14	12	1
Dressing	79	62	36	100	250	100	250	20	40	22	1
Slashing	80	62	35	200	600	400	200	28	65	42	3
Inspecting	79	62	37	800	100	100	100	22	4	1	1
Singeing	74	65	62	200	100	100	100	75	2	0	8
Wet finishing	68	62	71	100	8,400	6,600	100	2	2	0	0
Extracting	69	64	76	200	200	100	400	225	28	9	8
Dry finishing	75	64	54	100	800	400	2,200	67	12	3	0

No fermenting organisms found in the air from any of these rooms.

Combing and English and French drawing rooms examined in both Mill E and Mill F. Other processes examined only in Mill E.

Humidifiers in one combing room and in all drawing rooms. No humidifiers in any of the other rooms.

Drawing: From the combs the stock goes to the drawing machines where a number of strands of fiber are slightly twisted together and drawn out preparatory to spinning. In the manufacture of certain kinds of cloth both the combing and drawing are omitted and the sliver from the cards goes directly to the spinning machines. Two different methods are used for drawing wool, known respectively as the English and French systems. Four English and two French drawing rooms in two different mills were investigated, physical examinations only being made in one room of each kind and complete examinations being made in the other four rooms.

Considerable moisture and a fairly high temperature are considered essential in drawing wool by either of these processes, both French and one English drawing room being equipped with humidifiers of the spray type and steam being used to increase the humidity in the other three English drawing rooms.

In the English drawing rooms the dry bulb temperature ranged from 68° to 79° F., the wet bulb temperature from 58° to 78° F. and the relative humidity from 29 to 78 per cent. In one of the rooms in which steam was used the sensible temperature was above 70° F. in places while in another room the sensible temperature averaged 78° F., or considerably above the "comfort point." Bacterial examinations were made only in the three rooms in which steam was used to increase the humidity. The total bacteria in these rooms ranged from less than 200 to over 6,000 per cubic meter, the body temperature bacteria from less than 200 to over 3,000, and the number of moulds in the air from 200 to 600 per cubic meter. The bacterial counts on plates exposed fifteen minutes in all of these rooms were low but in a number of cases the body temperature counts were somewhat higher than the room temperature counts.

In the two French drawing rooms the variation in both actual and sensible temperatures was relatively small, the dry bulb temperatures ranging from 72° to 77° F., the wet bulb temperatures from 66° to 68° F., and the relative humidity from 59 to 78 per cent. The bacterial content of the air in both of these rooms was very low, the largest number of bacteria found in any of the samples being about 400 per cubic meter.

Twisting: After spinning, the yarn for certain kinds of cloth is further twisted to produce a hard finish, or two or more strands of different yarns are twisted together. The average dry and wet bulb temperatures in the twisting room examined were 69° and 56° F., respectively, the average humidity was about 43 per cent., and the average bacterial content of the air was about 400 per cubic meter.

Beaming and Winding: The yarn during spinning is usually wound upon spools, which are then transferred to another machine where the contents of a large number of spools are rewound upon one large spool or section beam. In the room examined the dry bulb temperature was about 77° F., and the wet bulb temperature about 60° F., and the relative humidity about 36 per cent. The average number of bacteria in the air of this room was about 600 per cubic meter.

Dressing and Slashing: In the dressing room the yarn from the section beams is usually run through tubs of sizing or dressing, then through squeeze rolls to remove the excess of size, after which it passes to the slasher where it is dried by being passed over heated rolls. These two processes are frequently combined in one room, but in the mill investigated were performed in separate rooms. The temperature and humidity conditions in both of these rooms were practically the same, the dry bulb temperature being about 80° F., the wet bulb temperature about 62° F., and the relative humidity about 36 per cent. Dressing being a wet process, the room was free from dust and the bacterial content was very low, less than 200 bacteria per cubic meter being collected by the sand filters. In the slasher room there was some dust, but as most of this originated from the heated yarn and dried particles of size, the bacterial content of the air was also low, averaging less than 600 per cubic meter.

Inspecting: During the processes subsequent to weaving, the cloth is usually carefully examined by perchers or inspectors three separate times: first, after it comes from the looms to check imperfections in weaving, second, after the knots and ends have been trimmed off and the imperfections have been mended, and third, after finishing. The inspecting rooms are generally clean and the air free from dust. In the inspecting room examined the average dry bulb temperature was about 79° F., the wet bulb temperature was about 62° F., and the relative humidity was about 37 per cent. The total number of bacteria in the air of this room was about 800 per cubic meter.

Singeing: Before dyeing and finishing, the cloth is drawn over red-hot rolls, or is passed through a gas flame, to remove the projecting fibers or nap and clean the fabric. In the room examined the singeing was being done with a gas flame, and the air was full of dust and smoke. The average temperature of this room was about 74° F., the wet bulb temperature was about 65° F., and the average humidity was about 62 per cent. The bacterial content of the air in this room was very low, the average number of bacteria being about 200 per cubic meter.

Wet Finishing: After being singed the cloth is passed through hot water and rolled on perforated cylinders and allowed to stand for some hours until cool to set the fibers and prevent excessive shrinkage in the following operations, and is then scoured to remove dirt and grease. Before dyeing, certain kinds of cloth are also submitted to a process called "fulling" or "milling" in which the moisture, heat and friction during the passage of the soaped cloth between rapidly-revolving rolls under high pressure shrinks it to the required extent, and softens the fiber thereby removing the harsh feel. In the wet finishing room examined the dry bulb temperature was about 68° F., the wet bulb temperature was about 62° F., and the relative humidity was about 71 per cent. The number of room temperature bacteria in the air was very low, but over 8,000 bacteria of the body temperature types were found per cubic meter.

Extracting: After "wet finishing" the cloth is dyed and washed, and is then put through centrifugal machines to extract the water before being "dry finished." In the extracting room examined the average dry bulb temperature was about 69° F., the wet bulb temperature was about 64° F., and the relative humidity was about 76 per cent. By the sand filter method only about 200 bacteria per cubic meter were found in the air of this room, but on plates which had been exposed for fifteen minutes about 225 colonies developed at room temperature and about 30 at body temperature.

Dry Finishing: After being extracted and dried by being run over steam coils, the cloth passes to the dry finishing room where it is first run through shearing machines to remove or even up the projecting fibers and is then pressed. More or less fly results from the shearing process which is usually removed by suction fans. The air of the dry finishing room examined was comparatively free from dust and fly. The average temperature of this room was about 75° F., the wet bulb temperature was about 64° F., and the relative humidity was about 54 per cent. The bacterial content of the air was comparatively low, but over 2,000 moulds per cubic meter were found by the sand filter method.

EFFECT OF HUMIDIFIERS ON NUMBERS OF BACTERIA AND MOULDS IN THE AIR.

In the cloth filter type of humidifier such as was studied in Mill A, a greater or less number of bacteria should be removed from the air during its passage through the wet cloths. The bacteria contained in the water which is evaporated into the air, however, should all be left behind on the cloths or in the unevaporated water. The humidifiers in this mill were operated entirely with city water, the small amount of unevaporated water being wasted.

The results of analyses of the air before and after passing through these humidifiers show a reduction of about 58 per cent. in total bacteria, about 30 per cent. in the body temperature bacteria and about 89 per cent. in moulds. The air from similar rooms in this mill which were not equipped with humidifiers contained about seven times as many room temperature bacteria, nearly nine times as many body temperature bacteria and about four times as many moulds, as the air of the rooms which were equipped with humidifiers. The unevaporated water coming away from these humidifiers contained about fifteen times as many bacteria as the water entering them. An examination of the cloths from one of these humidifiers showed that it was covered with a thick felted layer of cotton fibers, etc., which had been removed from the air.

With the various patterns of spray type of humidifiers such as were studied in the other five mills, the water is projected directly into the air before being evaporated with the result that any impurities in the water are added to those in the air. The action of the spray induces a certain flow of air through the apparatus which is washed by the unevaporated water, but the amount of air drawn in and purified in this manner is much smaller than in the case of the cloth filter type of apparatus. In considering the effect of these humidifiers, therefore, it is necessary to take into account two opposing factors, the addition of germs to the air of the room by the evaporation of the spray, and the removal of germs from the air drawn through the apparatus by the unevaporated water. In four of the five mills which contained humidifiers of this type, the average bacterial content of samples of air collected beneath those humidifiers was considerably greater than that of samples collected at points intermediate between them. In the case of Mill E the air under the humidifiers contained about forty times as many bacteria as that at a distance. The average difference in the numbers of body temperature bacteria, however, was relatively slight except in the case of Mill B, in which the counts on samples from under the spray averaged nearly three times as high as those on samples collected some distance away. In all of these mills the average bacterial content of the air of rooms which contained spray apparatus was considerably higher than that of rooms which were not so equipped. In the case of Mill E, the rooms in which the air had been artificially humidified contained over twenty times as many room temperature bacteria and over one hundred times as many body temperature bacteria as those in which the air had not been treated.

The results of analyses of the water before and after passing through these humidifiers show that in general no considerable numbers of bacteria were removed from the air of the various rooms in which they were installed. In Mills B, E and F there was an increase in the room temperature bacteria in the water amounting to 45, 19 and 10 per cent., respectively, while in Mills C and D there was a decrease of 61 and 38 per cent., respectively. Only in Mill E was any increase noted in the body temperature counts on the unevaporated water, however, while in Mill F a reduction of 58 per cent. in these counts was noted.

The amount of water supplied to the various types of spray humidifiers and the proportion of that water evaporated could not readily be determined, and the statements of the officials in the different mills in this particular were usually rather indefinite and contradictory, so that it is not possible to compute the number of bacteria introduced into the air by any of these humidifiers with any degree of accuracy. The following figures, however, will serve as an illustration of the possible effect of one of these humidifiers: In Mill A it was stated that 85 gallons of water were supplied to each humidifier and that 3 gallons of this water were evaporated. In the weave rooms in this mill the humidifiers were spaced 40 feet apart and the room was about 12 feet high, each humidifier, therefore, supplying moisture to approximately 550 cubic meters of air. The water entering the humidifier contained about 38,000 bacteria per cubic centimeter. Assuming these figures to be correct, about 429 million bacteria were introduced each day into the room by this humidifier or about 780,000 bacteria for each cubic meter of air served. In this particular mill there was a considerable increase in the numbers of bacteria in the water during its passage through the humidifiers and the same method of computation would show that more than seven times as many bacteria were removed as were introduced into the air. The results of numerous analyses, however, show that the air in the immediate vicinity of the humidifiers in this and other rooms in this mill contained 35 per cent. more bacteria than the air 30 or 40 feet away, while the average bacterial content of the air in rooms which contained humidifiers was almost twice as great as that of similar rooms which were not artificially humidified.

TABLE VI.

EFFECT OF HUMIDIFIERS ON GERM CONTENT OF AIR OF MILLS.

Mill.	Type of Humidifier.	Per cent. which counts on samples collected near humidifiers were of those collected 20 to 40 ft. away.			Per cent. which counts on samples in rooms containing humidifiers were of those without humidifiers.		
		Bacteria.		Moulds.	Bacteria.		Moulds.
		20° C.	40° C.		20° C.	40° C	
A.....	Cloth Filter	42	70	11	10	15	37
B.....	Spray	135	270	90	194	104	92
C.....	Spray	125	85	55	140	1,136	237
D.....	Spray	80	95	110	127	122	40
E.....	Spray	4,000	112	100	2,050	11,000	100
F.....	Spray	175	100	50	—	—	—

In two of the mills, B and D, the polluted Merrimack River water was used as a source of supply for the humidifier systems; in three others, A, C and E, the city supply was used, and in Mill F the river water after filtration through high-rate filters without coagulants was used. In the case of Mill A, in which cloth filter humidifiers were used, the greater part of the city water supplied to the cloths was evaporated and the small excess was wasted. With this type of apparatus, moreover, it is not probable that any of the water bacteria could pass into the air so long as the cloths were wet, and the quality of the water could have little effect on the bacterial content of the air. In the other mills, however, only a small proportion of the water supplied to the spray humidifiers was evaporated, the unevaporated water being passed through filters and returned to the humidifiers together with sufficient new water to make up the deficiency. So far as the total bacterial content of the humidified air or of the water supplied to the spray humidifiers is concerned, little difference is to be observed in the results which can be attributed to the quality of the water. The unevaporated water coming from the humidifiers in any of these mills always contained large numbers of bacteria. The filters provided to purify this water, while they may have satisfactorily removed the lint and dirt which would clog the orifices of the spraying devices, did not in any case show any considerable degree of bacterial efficiency. As a result, the water circulated through the humidifier system was always of high bacterial content, and the small proportion of new water added to replenish that which was evaporated was not sufficient to materially influence the bacterial content of the water in the system. In the case of Mill B, where river water was used, the numbers of body temperature bacteria in the

TABLE VII.

AVERAGE BACTERIAL ANALYSES OF WATER BEFORE AND AFTER PASSING THROUGH SPRAY HUMIDIFIERS.

	Mill A.	Mill B.	Mill C.	Mill D.	Mill E.	Mill F.
Bacteria per cc., 20°C.						
Water entering humidifiers	22	37,800	15,200	21,000	16,500	2,460
Unevaporated water after passing through humidifiers	334	56,500	5,900	13,000	18,900	2,700
Effluent water filters as returned to humidifiers	—	35,300	16,000	20,500	17,300	2,300
Water used to replenish supply	22	47,500	25	30,000	650	5,500
Bacteria per cc., 40°C. Total.						
Water entering humidifiers	1	258	28	52	49	24
Unevaporated water after passing through humidifiers	6	233	23	50	53	10
Effluent water filters as returned to humidifiers	1	248	28	50	52	22
Water used to replenish supply	1	300	24	80	1	52
Bacteria per cc., 40°C. Red.						
Water entering humidifiers	0	14	12	30	35	3
Unevaporated water after passing through humidifiers	2	0	5	28	28	0
Effluent water filters as returned to humidifiers	—	1	12	28	37	2
Water used to replenish supply	0	252	10	60	0	28

Mill A, cloth filter humidifiers operated with city water.

Mills C and E, city water used to replace water evaporated from spray humidifiers.

Mills B and D, river water used to replace water evaporated from spray humidifiers.

Mill F, river water after filtration through high-rate filter used to replace water evaporated from spray humidifiers.

water supplied to the humidifiers were very much higher than in any of the other mills, but in Mill D in which river water was also used these counts were not appreciably higher than in Mill E where the city water was used.

The average effect of humidification upon the bacterial content of the air and the analyses of the water in the humidification systems of the different mills are shown in Tables VI and VII.

Correction.

In the first portion of this paper printed in the November issue, the following typographical error was made:—

Page 1181, Table 1, Average Yearly Deaths per 1,000, should be, Average Yearly Deaths per 100,000.

AN APPARENT MILK-BORNE OUTBREAK OF PARA-TYPHOID.

Francis George Curtis, M. D.,
Newton Board of Health, Newton, Mass.

The following account of an apparent milk-borne outbreak of para-typhoid which appeared in several semi-urban communities of Greater Boston, during September and October, 1912, seems of sufficient interest to warrant its publication as a contribution to the epidemiology of the disease.

In the early part of September a number of cases of what was called "typhoid" appeared in three neighboring communities. They appeared at a time when "vacation typhoid" might be looked for, and attracted little attention at first, although there was practically no typhoid on record in the communities affected. It soon became evident that the cases were confined to the users of milk from one dealer, and the local Health Departments began an investigation to discover the cause if possible. The dealer, whose milk seemed responsible, did a fairly large business, collecting milk from some twenty-five or thirty dairies within a radius of twenty-five miles, bringing it to a central station where it was mixed and bottled for distribution. The milk reached the consumer not more than twenty-four hours after the milking. He was asked to furnish a list of all his producers, which he did, although there is reason to suppose that he suppressed the name of one, and the dairies were all visited with the result that no cases of illness among the workers could be found, nor were any of the workers of the central station found ill.

The cases still continued to occur, and finally one was found which reacted positively to para-typhoid. Previous to this the cases had given a non-typical Widal, showing good agglutination, but not complete loss of of motility. In some instances careless observers had reported these cases as "typhoid," while in others they were reported as non-typical and a second specimen requested; a request which was seldom complied with. No blood cultures had been made.

Acting on the information obtained from the first positive para-typhoid reaction, other cases were tested for para-typhoid with the result that practically all reacted positively, with certain exceptions to be referred to later.

A second investigation was made with the following results:

(1) It was found that an Italian had been working at the central station up to October 14, when he left. From information obtained it was thought advisable to trace out this man, which was done and the following history

obtained: He had had typhoid fever two or three years ago. On August 22, 1912, he had what he called "grippe" which lasted until the end of September, the symptoms being general malaise and slight fever. He continued at his work during the attack, this work consisting of collecting milk from some of the dairies and washing the cans.

(2) Two cases of illness were found at one of the dairies, a dairy which had not been included in the first list furnished. These cases were called typhoid, and were said to have shown a positive Widal; the first case was said to have developed on September 22 and milk from that dairy had been used by the dealer until October 3.

The problem was to explain an apparent para-typhoid outbreak when the two possible sources of infection were, the Italian, a possible typhoid carrier, and the typhoid cases at the dairy, milk from which had gone into the general supply as late as October 3. It seemed easier to overthrow the diagnosis of typhoid in the second source and perhaps show that the Italian was not a carrier of typhoid.

The local health department, under whose jurisdiction the Italian then was, reported that he reacted positively to the Widal test and that his urine and fæces were negative. He was not tested for para-typhoid. Subsequently it appeared that the reaction with the typhoid broth was not absolutely typical, but that the observer had placed a "?" after his finding. It was not made perfectly clear why this was done.

A second visit was paid to the dairy where the two cases of "typhoid" were and it was found after careful questioning that the man, who had first stated that he had taken to his bed on September 22 had in reality had intermittent diarrhœa, general malaise and slight "fever turns," beginning the last week in July and continuing until he took to his bed. He had attributed his condition to overwork and during the whole period had continued milking his cows, the milk being used until October 3, when it was stopped.

The laboratory where the specimen of this man's blood was examined, in reply to a letter of inquiry, stated that "the test was not typical with typhoid broth (good clumps but not complete loss of motility), but was absolutely typical with alpha-para-typhoid."

From this it appears that this man had para-typhoid and not typhoid and that the possible period of infection of the milk was from the last week in July until October 3.

The distribution of this milk is interesting, for as a rule it was sent directly to certain provision stores in one of the communities affected and not mixed with the general supply. Sometimes when there was a shortage of milk it went into the general supply and was distributed with it. The community to which it usually went had more than half the total number of cases.

The Italian at the central station who had "grippe" from August 22 to the end of September was probably the first case. Here it cannot be shown definitely that the man had para-typhoid. He was said to have shown a positive Widal with typhoid, but as has been stated the observer questioned the finding on his own record, although at first he reported the result as positive. The urine and fæces were negative to typhoid. The fact that he had had typhoid two or three years previously may have caused a non-typical Widal with typhoid. The second case appeared about September 10 in a boy six years of age. This case, which was a non-resident, was not reported to the local board of health at the time, but late in October after his recovery and return home his father wrote, reporting it. It was called "typhoid" at the time but as far as can be learned, the diagnosis was entirely clinical and the case very mild.

As the boy drank the suspected milk, it is fair to assume that it was a case of para-typhoid.

Cases continued to occur from this time until November 6 when the last case was reported.

Here is a range of possible milk infection from a date in July which cannot be fixed definitely but was probably during the last week, to October 3, when the milk was stopped, or, if it is granted that the Italian had para-typhoid, to October 14 when he left work, while the range of cases among the users of the milk was from the third week in August to November 6.

In all, as nearly as can be determined, there were twenty-five cases among the users of this milk, of which number fifteen gave a positive reaction with alpha-para-typhoid, and one, the only fatal case and the last reported, gave a positive Widal with typhoid from a specimen of blood taken immediately after death. This case gave a negative reaction to both typhoid and para-typhoid less than a week before death. No autopsy was obtained.

This case is included in the series because she was a user of the milk and while it is possible that she might have contracted typhoid from another source, careful investigation failed to show any such probable cause.

In partial explanation of the fact that only fifteen out of the twenty-five cases gave a positive reaction with para-typhoid it may be stated that many of them were not discovered and tested until after convalescence, and it was found that the other cases, which gave a positive reaction during the illness, lost it soon after defervescence.

In the few cases which came to hospital treatment, the clinical course of the disease resembled that of a mild attack of typhoid fever. Rose spots were observed in these cases.

It was impossible to determine the period of incubation, as the majority of the cases were habitual users of the suspected milk.

In two instances, however, approximate data are available. In one case, a non-resident aged six years, the attack developed about ten days after beginning the use of the milk, and in one of the last cases, the first feelings of illness were noticed on November 3, while the last probable infection of the milk was on October 14 when the Italian ceased work.

SUMMARY.

In all there were 25 known and 3 probable cases. Of the 25 known cases, 15 reacted positively to alpha-para-typhoid and one to typhoid.

All the cases, known and probable, were users of the suspected milk.

During the period under consideration there were no other cases of paratyphoid in the communities affected.

In two of these communities, whose combined population by the Census of 1910 was 67,598, no cases of typhoid existed or were reported during the period under consideration.

The milk was undoubtedly infected by the dairyman who was ill during July, August and September.

It could not be determined where he acquired his illness.

He could have infected the milk either directly by contact or indirectly through the water used for washing the utensils, as the privy was about 100 feet distant from the well and on a higher level.

I am indebted to Dr. J. L. Drummey of Watertown, Mass., and Dr. A. P. Mason of Fitchburg, Mass., for information in regard to the outbreak.

THE NEW INTERCEPTING SEWER SYSTEM OF NEW BEDFORD.

William F. Williams, C. E.,
Chief Engineer, Massachusetts State Harbor and Land Commission, Formerly City Engineer of New Bedford.

Read before the Massachusetts Association of Boards of Health, October 9, 1913.

New Bedford has a population at the present time of somewhere in the neighborhood of 105,000. At the time the act was passed in 1910, authorizing the city of New Bedford to spend $1,600,000 for the construction of an intercepting sewer system, the population was about 100,000 and the area was nineteen and one-third square miles. It is a very long city, but is only about two miles in its greatest width and about ten and three-fourths miles in length. At that time the combined sewer systems of the city had a length of eighty-two miles and had cost considerably over a million dollars. Separate sewers had been built for a length of five miles, but there are, of course, the eighty-two miles, at least, of combined sewers to be considered in the creation of a project to take care of the sewage of the city.

Briefly, the city slopes to the Acushnet River, or the harbor and to Clarks Cove. Really the Acushnet River is only a tidal estuary of Buzzards Bay. You have been on County Street twice today, and that street for some distance is a sort of backbone, or ridge, which marks the division of the water shed of the city. Everything to the east of County Street flows to the Acushnet River, and nearly everything to the west flows to Clarks Cove. This is the body of water on which the pumping station and screen station are located. A large proportion of the volume of the city's sewage is discharged into Clarks Cove. The tidal action keeps the water constantly rising and falling, but the prevailing southwest wind forces the sewage to the head of the cove, so that it has been a nuisance for a great many years as it lies there right on the edge of a large residential section of the city. Therefore, the problem was to dispose not only of the sewage but of a considerable amount of rain water collected from this large water shed.

The surface area drained by the combined sewers was estimated to be 4,000 acres, and this was assumed as the maximum area from which it would be necessary to provide for surface water. There are thirty-one sewer outlets in the Acushnet River and eight in Clarks Cove. The salt water was, of course, the natural disposal point for this sewage. If New Bedford had been an inland city, it would have been necessary to devote considerable time to the study of purification and perhaps the city would have been forced to adopt some one of the various purification systems now in use. It is hardly necessary for me to say to you, professional gentlemen, that the septic tank, the sprinkling filter, the slow sand filtration, and also the Imhoff tank, are only attempts by man to improve upon nature. The oxidation of organic matter by the growth and development of bacteria has been going on so many years that you will not expect me to tell you when it commenced. It is accomplished, we believe, by the operation of a certain amount of oxygen which exists in the atmosphere and in the water, which apparently is not fully occupied. In the air we call it "free oxygen," and in the water "dissolved oxygen." Whatever its condition, it is there, and it is available for the oxidation of organic matter. Therefore, if we can only have an unlimited supply of clean water for sewage to discharge into, we need have no fear of the creation of a nusiance by lack of proper fermentation of the organic matter.

Buzzards Bay seemed amply able to provide an unlimited supply of pure salt water. Fresh water would have been just as good if we had had it, and perhaps better, but it was salt water that we had, so the problem really resolved itself into getting the sewage of the city as far into Buzzards Bay as was possible at a reasonable cost.

The sewers, as I have said, all empty into either the Acushnet River or the head of Clarks Cove. Therefore, the natural way to relieve the situation was to construct an intercepting sewer the entire length of the city, intercepting all the sewers that were already built, and now discharging into the river and the cove, and then convey their combined flow to the sea by gravity.

Owing to the fact that very much of the territory of New Bedford adjoining the waterfront is at a comparatively low level, being in fact only a few feet above tide water, it was necessary to give the intercepting sewer, if it was to discharge by gravity, a very low grade or pitch in order not to leave too large a territory between the sewer and the water front that could not be drained. To this end the grade finally adopted was only .33 of a foot in 1,000 feet. This is a very flat grade, nevertheless the sewer is figured to discharge, under normal conditions, 120,000,000 gallons a day.

Now I want to say a word as to how we arrived at the capacity of this sewer, because it is one of the interesting points and is also one of the fundamental principals involved in designing an intercepting sewer system. It, of course, stands to reason that with the combined sewers taking the rain water of 4,000 acres, an intercepting sewer which would take care of all this surface water would have to have tremendous size or tremendous capacity due to grade and size. It was essential, however, to take care of a moderate rainfall, because, as you know, the first effect of a rain, whether moderate or large, is to flush the sewers of whatever sewage may have accumulated in them. After that the flow is principally rain water, and it can be discharged into most any body of water without doing any particular harm.

An inch of water on 4,000 acres of land amounts to about 110,000,000 gallons. To this was added 10,000,000 gallons per day for the flow of the separate sewers. A run-off of an inch of water in twenty-four hours may be assumed as the run-off of a rainfall varying from an inch in twenty-four hours to a rainfall of an inch and a half in twenty-four hours, depending upon the character of the development of the territory contiguous to the sewer. Naturally it is one of those things which is constantly growing greater. On a paved street section it comes pretty near to being the whole rainfall.

I said, "We will assume a rain-water flow from these combined sewers of an inch of water in twenty-four hours, which will take care of an actual rainfall from an inch to an inch and a half in twenty-four hours." The great majority of rainfalls, as shown by the records kept for many years, are much below one and one-half inches in twenty-four hours, and, as I said before, the sewer will in any event take care of the first run off of any rain. When the capacity of the intercepting sewer is reached it will discharge its overflow, which will consist of rain water with a small amount of sewage, through certain selected outlets into the river and into the cove. At the point of connection between the regular sewers and the intercepting sewer there will be regulating chambers where the regulation of the flow will be accomplished.

When the sewer is completed to the point to which it is now laid out, which is to Belleville road at the north end of the city, it will have, together with the outlet into the bay, a total length of 36,000 feet. The greatest difficulty at first will be to get enough sewage and water into the lower part of the intercepting sewer to operate it properly, and prevent deposits. Therefore, for a time, all the flow of the sewers in the lower part of the city will be taken into the intercepting sewer. Possibly it might not take all of a very heavy rainfall.

The next step in the problem was to reduce the conclusion to the per capita unit of comparison.

Here is a city of 100,000 people with great expectations as to future growth, nevertheless it was necessary to assume a future population of 300,000 to reduce the figured capacity of the intercepting sewer to about 400 gallons per capita per day. Even this is a little larger than most cities estimate as the sewage flow per capita, but it struck me that I had gone about as high as I wanted to in assuming the growth of population. Therefore, for purpose of comparison in the usual unit of discussion, I have always stated that the system was designed to provide for a run-off of 400 gallons per capita for an assumed population of 300,000, but, as a matter of fact, the capacity was estimated independently of per capita flow as I have explained.

When this project was referred to Messrs. Metcalf and Eddy and also to Professor Sedgwick and Professor Phelps for consideration of the physical and sanitary side of the problem, I think they were all rather impressed with the feeling that I had made the design full large, and it was suggested that it might be reduced and a considerable saving secured, but I said:

"Gentlemen, the city of New Bedford has a condition which is extremely offensive to its citizens. The waters of the river and the waters of the cove are polluted to such an extent that it will take some time to purify them, even under the most advantageous circumstances. In my judgment it is unwise to take any chances that will imperil the success of the removal of this pollution. It doesn't make any difference if the sewer does appear large; if it will secure the greatest possible removal of sewage from the the waters near the shore. From my experience with municipal improvements I am satisfied that the day may come when we may be criticised for making it too small, but I haven't any fear of ever being criticised for making it too large." Later this view was concurred in by all concerned.

Having settled the question of capacity, it then became necessary to select the exact point in the bay where the outlet should be located. For a number of years we had been making tidal observations in the Acushnet River to determine the extent of the tidal flow, hoping that possibly we might find a location above the extreme end of Clarks Point where the sewage could be discharged without fear of creating a nuisance, but the observations showed there was no such location and we finally carried our investigations into the bay beyond the end of Clarks Point, and at last, with the approval of the State Board of Health, decided upon a location about 3,300 feet off the extreme end of Clarks Point. From this location the floats showed no disposition to reach the shore in any direction. We experimented with every kind of float we could think of or read about and went into the matter very thoroughly. Any kind of float will cover a greater distance than sewage will because they are more affected by the wind The State Board of Health also carefully studied our data and suggested the location finally adopted, 3,300 feet off the extreme end of Clarks Point in water thirty feet deep.

The outfall portion of the sewer is a cast-iron pipe, 60 inches in diameter, laid by divers in a trench dredged in the bottom of the bay. The outlet is a quarter turn which is laid in a very heavy structure, of concrete and timber, surrounded by rip-rap. The sewage as it is discharged from the pipe comes in contact with a great body of water which is kept in motion by the tidal currents of the bay. It would be a very simple matter to calculate the approximate amount of dilution, but I won't burden you with that because it runs up into very large figures.

At the end of Clarks Point, where the concrete sewer joins the cast-iron pipe, there is a regulating chamber with gates which can be shut when the sewage flow is low and there is danger of sand or sewage depositing in the outfall sewer. At such times the gates can be closed and the sewage allowed to head up in the intercepting sewer. With this head and the added head gained by waiting for low tide, the outfall sewer can be flushed.

There is one other feature of the design of the system which may interest you and that is the provision for screening the sewage and taking out sand. In connection with coarse screening to remove floating matter it was also thought desirable to put in grit tanks to take out the sand which may get into the intercepting sewer from the combined sewers. In spite of the fact that there are the usual catch basins all over the city, a great deal of sand does get into the sewers. We know this from the fact that the city has to spend a considerable amount of money for dredging the docks at the outlets of the present sewers. Therefore the plans call for building a combined screening station and grit station. You saw the foundation of this combined station on the west side of Clarks Point, about 8,000 feet from the outlet of the outfall sewer.

I explained to some of you gentlemen while there that the station consists of three chambers, a central one for the passage of the dry weather flow, as we call it, which will take care of the sewage at all times except in a rain storm, and two chambers, one on each side of the central passage to take the flow when it is raining. There will be two sets of vertical screens in front of each chamber, one set being in operation all the time. These screens, by the way, will be lifted electrically In fact, all the operations requiring power in this plant will be performed electrically.

At the entrance to each chamber is a cast-iron sluice gate, which will also be operated by electric hoists. With these gates any chamber or all of the chambers can be closed, and in an emergency the sewage can discharge direct into Clarks Cove by an overflow north of the building. During a rain storm the sewage will be diverted from the central passage through one of the grit chambers. The bottoms of these chambers are about six feet below the invert of the sewer. There is also a slight enlargement in width. These conditions check the velocity of the sewage and, if the sand does as it ought to under these conditions, it will be deposited, thus separating itself from the lighter organic matter of the sewage.

The usual operation of grit chambers is to allow them to fill up and then excavate the deposited material. But under these conditions considerable sewage is retained in the chamber which soon becomes very offensive. This station is designed to try another device. Some of you—perhaps many of you—have seen the sand washers that are used in the sand filtration plants of water systems of such cities as Philadelphia, Washington and Pittsburgh. The sand from the filter beds is passed through an apparatus where a large amount of water is mixed with it, separating the organic matter which goes to waste through an outlet while the sand is passed right back upon the filter beds washed perfectly clean. It is intended to try to do the same thing with the sand taken out of these grit chambers. Furthermore, it is hoped that the sand can be taken out almost continuously during the period of a rain storm by means of sand pumps, so called, that work on the principle of an ejector, using water under pressure instead of steam. If it works successfully the washed sand will be used for filling and the wash water and sewage will pass back into the sewer and flow off to sea. If it doesn't work, the chamber will be allowed to fill up in the ordinary way, and the sand and organic matter taken out by some device like the clam-shell bucket and discharged into scows which will be towed to sea. When one chamber is being cleaned the other will be in operation, therefore it does not cause us any serious concern even if the other scheme will not work, but we hope that it will.

In addition to the provisions for screening and for separating the sand in the sewage the city secured the advice of Professor Sedgwick and Professor Phelps upon the disinfection of the sewage to prevent the contamination of sea food. These gentlemen gave the question careful study and made a report recommending that the city provide facilities for adding a solution of bleaching powder to the sewage before it is discharged into the bay. This will be added at the lower end of the station, after the sewage has passed through the screens and sand chambers and is on its way to the bay. A room will be provided with the equipment for mixing a solution of bleaching powder and adding it to the sewage in whatever volume is necessary. The details of this part of the plant have not yet been completely worked out, although they are tentatively decided upon. The principal difficulty will be to obtain some device that will automatically adjust the percentage of bleaching powder to the varying degree of dilution of the sewage, from the concentrated sewage of dry weather to the diluted sewage during a heavy rainfall. This problem has yet to be worked out, but I think it can be done.

One other point in connection with this sewer will be of some interest, although I am not going into it in detail as it would take a long time and I am afraid you would get very tired. There are certain low level sections of the city, contiguous to the intercepting sewer, that cannot be drained by gravity. These sections are also hampered at the present time by the fact that they are altogether too low to properly drain existing cellars and with heavy rains and a high tide they are flooded. It is proposed to take care of these low level sections by small independent pumping stations, which will collect the sewage and pump it into the intercepting sewer. The Clarks Cove pumping station is built and you have seen it. This station has two eight-inch centrifugal pumps, driven by induction motors, with room for two more larger pumps. The estimated ultimate capacity of this station will be about 13,000,000 gallons in twenty-four hours. The plans also call for another station farther north in the locality of Howland and Water Streets which is near the point where you first saw the intercepting sewer. This station will take care of quite a low section of the city and farther north another station will be built. These stations will not be made quite as elaborate as the Clarks Cove station which you saw. That station is in a locality where it might create unfavorable criticism if the city had undertaken to build too economically and thus fail to avoid the disagreeable features that might be connected with the material it was to deal with. So it was decided to make it as attractive as possible. The plan also provides adequate means for the ventilation of the chambers by fresh air inlets underneath the floor and a connection between the sewage well and the chimney. We leave it to you, gentlemen, to say how well we have succeeded in keeping down offensive odors and in making the building look attractive. But the next station, being smaller, will be built entirely underground, so that to the eye there will be nothing to suggest a pumping station. A tank or receiving reservoir will be built in the middle of the street, and the pump chamber will be under the sidewalk. There will be only an ordinary plate in the sidewalk covering the point of entrance to the pumping station.

All these stations will be operated automatically. The apparatus in the station you saw is made by the General Electric Company. I will not take the time to describe it in detail. The apparatus is operated by floats rising and falling in cast-iron pipes placed vertically in the sewage well.

As I stated to you in the first place, I have not attempted to present to you a carefully prepared paper, but have rather trusted to my memory to tell you the essential details of the work.

In closing I desire to say that I appreciate the honor you have done me by asking me to speak to so large a body of professional men, and men so intimately connected with the sanitary welfare of this Commonwealth.

THE PREVENTION OF TYPHOID FEVER IN THE RURAL DISTRICTS OF VIRGINIA

ALLEN W. FREEMAN, M. D.,
Assistant Commissioner, Virginia State Health Department.

Read before the General Sessions, American Public Health Association, Colorado Springs, September, 1913.

The campaign for the prevention of typhoid fever in the rural districts of Virginia, which has been carried on by the Virginia State Health Department since its reorganization in July, 1908, has been based on the conclusions regarding rural typhoid in Virginia presented to this Association in a previous communication by Dr. L. L. Lumsden and the writer.

Those conclusions were:

1. Typhoid fever of the rural districts of Virginia is largely a matter of the summer months, appearing quite regularly at the beginning of June and ending usually about the middle of September.
2. In the winter months, localized water-borne outbreaks of the disease sometimes occur.
3. In the summer months the influence of water in the transmission of the disease is not apparently of great importance.
4. Direct personal contact with the sick, particularly in those nursing the patients is an important means of spread of the disease.
5. Milk and foods of various kinds coming from infected houses frequently carry the infection.
6. General dissemination of human fæces, particularly by the fly and on the feet of fowls and domestic animals is an important means of spread.
7. Mild cases of typhoid infection, clinically unrecognizable, serve frequently as distributors of the infection. Such cases probably occur in considerable numbers wherever typhoid is prevailing.

The prevention of typhoid fever in the rural districts of Virginia, while a matter of great difficulty and of necessity requiring many years for its accomplishment, rests, we believe, on the following simple elements:

1. The general education of the people as to the nature and means of spread of the disease, particularly as to the dangers of contact and food infection.
2. The isolation of the sick and the disinfection of the excreta together with the bed and body linen.
3. Recognition of human excrement as the most dangerous material on the farm, and so providing for its care and disposal that it be kept off

the ground, in a water tight receptacle, screened against flies and animals, until burned, disinfected, buried or otherwise safely disposed of.

The recognition of human filth as the source of the infection, and the avoidance of all fecal contamination, whether by flies, food, clothing, hands, water, or any other means whatever, constitutes the one and only precaution necessary for the absolute prevention of the disease.

In the campaign of prevention, we have deemed it absolutely essential that the average citizen be accurately informed regarding the means of spread and of prevention of typhoid fever, and for this purpose have carried on a continuous and active campaign of popular education regarding typhoid fever. The bulletin on typhoid fever, originally issued in 1908, has been twice rewritten and republished and a total of nearly two hundred thousand copies have been circulated.

In addition to the bulletin devoted especially to typhoid fever, various other bulletins have carried more or less extensive articles on the disease and probably more than half a million simple and easily comprehensible articles on typhoid fever have been placed in the hands of the lay readers of Virginia.

For the purpose of attracting the attention of those to whom our bulletins did not originally go, posters were prepared and issued calling attention to the salient facts. Ten thousand of these were posted in post offices, railroad stations and country stores.

The regular press service of the State Health Department has carried more than fifty notices regarding the prevention of typhoid fever, printed in practically every county and most of the city papers of the state.

The campaign of printers' ink has been supplemented by a lecture campaign, in which every county in the state has been reached and practically every community has received one or more lectures, frequently illustrated by the lantern, on the disease.

By this means, every citizen of Virginia has had the simple fact that typhoid fever is spread by the dissemination of human excreta and can be prevented by stopping that spread, laid before him, not once only, but over and over, and from many angles. The state has been completely evangelized with the gospel of fecal conservation. In addition to this widespread evangelization, we have endeavored to reach the bedside of the individual case. Every doctor in Virginia has been appealed to, over and over again. Bedside directions, in the most convenient form, have been furnished him for distribution and no stone has been left unturned to get the doctor to institute bedside prophylaxis.

The fly has been the object of sustained attack. Bulletins, press notices, lectures, moving picture films and swatting campaigns have all been utilized.

But the crux of the whole campaign, the one element by which the whole structure will stand or fall, has been the campaign for the sanitary privy. In this work, the forces concerned with hookworm eradication have been of immense service.

For the purpose of gaining exact information of existing privy conditions at country homes, a sanitary survey has been undertaken. Sixty-seven out of the one hundred counties of the state have been surveyed and 13,495 country homes inspected. Upon the information thus gathered has been based the campaign for the sanitary privy. In the three years of the hookworm work, 1,862 public lectures have been delivered to 180,000 persons on hookworm disease and the sanitary privy.

The State Department of Agriculture has aided materially in the work. A lecturer on farm sanitation has traveled with the farmers' institute trains and more than 20,000 farmers reached by this means alone. The State Board of Education is coöperating in the work of securing two sanitary privies at each of the 9,000 public school houses of Virginia and this work will, in all probability, be completed in 1915. One hundred and fifty thousand copies of the department's leaflet on the sanitary privy and 55,000 of the Lumsden-Stiles bulletin of the Federal Department of Agriculture have been distributed in the rural districts of the state.

In furtherance of the work, a sincere effort has been made to secure the education of our people regarding the dangers of impure water and the means of securing proper water supplies on farms. Two bulletins on good water have been issued in addition to numerous press notices and other literature.

In addition to this somewhat extensive campaign of education and evangelization, more direct methods have also been employed. The epidemiologist of the department is, of course, always available for epidemic work, but in addition during the summer months a typhoid field force is organized for work in small towns and rural districts. Investigation of typhoid conditions is made on request of local authorities or as soon as undue prevalence is disclosed in any community. In these investigations effort is made to determine the means of spread of the disease and to formulate proper procedures for controlling it. The visit to the infected house made necessary by this investigation is, of course, utilized to inspect bedside prophylaxis and to insure its accurate practice. It has been possible, using the same forces year after year, to standardize the work and to investigate practically every outbreak of more than five or six cases in any rural district.

The investigation of the causes of spread of typhoid fever begun in 1911 and reported in part to this Association were continued in 1912 and completed in 1913. The results will be reported in another place.

In addition to education, investigation and direct means of prevention, we have been much interested during the past year in the use of typhoid vaccine in members of families in which there is a case of typhoid. This was extensively used in the summer of 1913 with uniformly good results. We hope to secure large extension of this method of prevention in coming years.

The results of this campaign have been evident. The interest of the people at large in the prevention of typhoid has been greatly increased and their knowledge of the means necessary to this end enlarged. Bedside prophylaxis has undoubtedly been wonderfully improved. The campaign for the sanitary privy has begun slowly to show results in the building and use of the types recommended by the department. Most important of all, the number of cases, reported and estimated, has shown steady and decisive decline, as shown by the table:

Year. October to October.	Cases.	
	Reported in State.	Estimated in State.
1908–1909	7,700	13,069
1909–1910	6,771	11,843
1910–1911	5,959	11,803
1911–1912	4,608	8,480

It is to be regretted that our registration law which went into effect in June, 1912, has not been in operation sufficiently long to give statistics of value on this point.

We believe that when every citizen of Virginia knows the simple, essential facts about typhoid fever, when bedside prophylaxis is universal, the sanitary privy in general use, every outbreak promptly investigated and vaccination of exposed persons practised without delay, we will make typhoid fever in rural Virginia a rare disease and we are working, confident of ultimate success, to that end.

REPORT OF COMMITTEE ON WATER SUPPLIES.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

The instructions to the committee indicate that it is desired to have a report setting forth some of the more important topics for discussion in this general field, together with such preliminary or final reports on special aspects of the broad field as it may see fit.

This committee has no final report to make upon any topic.

It mentions briefly six features of water supply developments which are considered to be among those of most educational value at this time, as follows:

Hygienic aspects.
Rate of installation of filters.
Sterilization.
Decolorization with overdose of coagulant.
Decolorization as an adjunct of softening.
Corrosion of metals.

Other topics are, of course, interesting and progress in them is being made. The topics outlined in this report, however, with the discussions of details that are hoped for at the convention, should fully occupy all the time available for water supply matters and lead the way for more definite committee action another year.

No attempt is here made by this committee to enter into the field of pollution of water supplies by either municipal or trade wastes. It is assumed that this field will be taken care of in due time by other committees. For the present it is the feeling of this committee that substantially all surface water supplies should be filtered in order to be of satisfactory quality. There are some exceptions to this rule, but the conditions surrounding these exceptional supplies depend so much upon local factors that there can be no ready classification of their characteristics.

THE HYGIENIC ASPECT OF PUBLIC WATER SUPPLIES.

Notwithstanding the sterling hygienic worth of modern filters, as set forth in numerous official reports, articles in technical papers and authentic statements in text-books, there are published from time to time individual opinions to the effect that filtration works produce little or no favorable influence upon the public health of the community enjoying them. It is well for sanitarians to keep clearly in mind the splendid record made at the large number of filter plants which treat polluted surface waters so that the quality of the effluent is hygienically above reproach and so that the vital statistics of the water consumers are as favorable as those in communities similarly situated which receive water of unquestioned purity either from underground sources or from uncontaminated mountain areas. In this connection attention is called to the typhoid fever statistics from certain northern cities equipped with modern filtration plants, as follows:

ANNUAL AVERAGE DEATH-RATES FROM TYPHOID FEVER PER 100,000 POPULATION.

City.	Plant Completed.	Years in Average.		Typhoid Fever Death-Rates.	
		Before Filtr.	After Filtr.	Before Filtr.	After Filtr.
Mechanical Filters.					
Binghamton, N. Y.	1902	5	5	47	15
Cincinnati, Ohio	1907	4	4	50	12
Columbus, Ohio	1908	11	3	78	11
Hoboken, N. J.	1905	7	6	19	14
Paterson, N. J.	1902	5	9	32	10
Watertown, N. Y.	1904	5	7	100	38
York, Pa.	1899	2	12	76	21
Sand Filters.					
Albany, N. Y.	1899	9	9	74	22
Lawrence, Mass.	1893	7	15	114	25
Washington, D. C.	1905	5	6	57	33

There are other intestinal diseases beside typhoid fever which are transmitted by water supplies, and which show low death-rates in instances where a community is supplied with good water. How far a good water supply affects the general health tone of a community as reflected by vital statistics in diseases other than those of the intestinal group is a matter upon which information is not conclusive owing to the variation in data obtained from various cities. Evidently the accuracy of the classification of the causes of deaths is a factor in weighing the statistics. It is an important field for investigation.

That typhoid fever and other intestinal diseases known to be sometimes water borne are due at other times to inadequate sanitary conditions other than the public water supply is, of course, well known. The subject has been well studied at Washington, D. C. The influence of other factors than the public water supply is particularly striking in the southern cities. For instance, at New Orleans, there is one of the best filter plants in this country, operated in a very efficient manner and producing filtered water of highest hygienic quality. Notwithstanding this, the vital statistics show that New Orleans did not enjoy until last year a very low typhoid fever death-rate and that the New Orleans rates are not low in other diseases more or less related to the public water supply. The following statistics throw light upon this question:

ANNUAL TYPHOID FEVER DEATHS PER 100,000 POPULATION IN NEW ORLEANS, LA.

Before Filtration.		*After Filtration.*	
1904	36	1909	29
1905	32	1910	32
1906	30	1911	31
1907	55	1912	14
1908	29		

Even higher death-rates from this disease are to be found at Atlanta, Ga., and Birmingham, Ala., where filter plants of quite modern design are in use.

The report for the year 1912 of the Sewerage and Water Board of New Orleans contains a discussion in considerable detail of the sanitary effects produced in New Orleans by the introduction of the new drainage, sewerage, and waterworks systems. Conditions are unusual in New Orleans in that the public water supply has never given indication of being appreciably polluted, if at all. This seems to hold true not only of the present filtered supply from the new city plant, but also of the unfiltered Mississippi River supply furnished by the old plant of the water company prior to 1909, as well as of the individual supplies obtained from cisterns. Typhoid fever in New Orleans apparently never assumed large proportions, and local data indicate that a large share of the cases resulted primarily from importations, some of which produced local foci of the disease, resulting in the spread of the disease through flies, milk, and the food supply during the days when there was a lack of sewerage and drainage facilities, as well as of proper care in disinfection. It seems to be the custom for typhoid patients in various parts of Louisiana and Mississippi, and even more distant states, to be sent to New Orleans, particularly to the Charity Hospital there. The control of this disease at its point of origin is of course beyond the jurisdiction of the New Orleans authorities, who have, however, to deal with the problem of preventing the spreading of the disease within the city, whether the various foci relate to an imported case or not.

Among the many interesting features developed at New Orleans, mention may be made briefly of the fact that in a city having a population of at least 354,000 and with at least 75,000 premises there were at the end of

1912 only about 28,500 premises connected with the sewer system and 46,000 premises connected to the new waterworks system.

The present drainage system, on the other hand, was put in service in 1900, and from the outset had very nearly its present capacity and efficiency. Before its installation storm water could be removed only to less than one-third the extent of the present system, with the result that all the drainage channels formerly stood nearly full all of the time; and small rains flooded the ground at numerous points so that the ground was constantly supersaturated. The installation of the drainage system showed itself at once through the lowering of the general death-rate of the city, which, prior to 1900, had ranged for individual years from 24.1 to 30.2 per 1,000 population, averaging 27.2. During the first ten years, 1901–10, after the installation of the present drainage system the annual general death-rate ranged from 23.6 to 20.3 and averaged 22.1 per 1,000 population. The general death-rate in 1911 was 20.4 and in 1912 it was 20.1.

Malarial fever is one of the diseases that was materially lessened as a result of the new drainage system at New Orleans. From 1891 to 1900 the average annual death-rate per 100,000 population was 104. For the ten years after the opening of the drainage system the annual rate was 20. In 1911 and 1912 the death-rates per 100,000 population were 9 and 8, respectively.

What is said above for New Orleans doubtless applies to other southern cities, showing that typhoid fever and other diseases relate essentially to means of preventing a spreading from local foci due to fleas, insects, and other ways of infecting food supplies. Important work along these lines has been done at Richmond, Va., Jacksonville, Fla., and other places.

RATE OF INSTALLATION OF FILTERS.

A table was presented before the International Congress of Hygiene and Demography in Washington in 1912 by Mr. Allen Hazen, giving the population supplied with filtered water for several decades, and to which we have added figures for the current year, as follows:

Year.	*Total Population Supplied with Filtered Water.*
1870	None
1880	30,000
1890	310,000
1900	1,860,000
1910	10,806,000
1913	13,290,000

During the period 1904 to 1913, works were built for supplying filtered water to the following cities of 100,000 population or over:

City.	*Population.**
Philadelphia, Pa	1,549,008
Pittsburgh, Pa	533,905
Washington, D. C	331,069
Indianapolis, Ind	233,650
Providence, R. I	224,326
Cincinnati, Ohio	364,463
New Orleans, La	339,075
Hackensack, etc., N. J	250,000
Louisville, Ky	223,928
Columbus, Ohio	181,548
Toledo, Ohio	168,497
Atlanta, Ga	154,839
Birmingham, Ala	132,685
Scranton, Pa	129,867
New York, partial	100,000
Minneapolis, Minn	301,408
Grand Rapids, Mich	112,571

A number of cities in Canada have also, within the last few years, built or are building water filtration plants. Among these are:

City.	*Population in 1911.*
Montreal	470,480
Toronto	376,538
Saskatoon	12,004

Steps have also been taken in the direction of water filtration plants at

Ottawa	87,062
Hamilton	81.969
Brandon	13,839

A number of cities in the United States have in the last year or so either placed contracts for or have been seriously considering filtration plants, the principal ones of which are:

City.	*Population.**
New York City (Boroughs of Manhattan and Bronx)	2,762,522
Hartford, Conn	98,915
Baltimore, Md	558,485
St. Louis, Mo	687,029
Trenton, N. J	96,815
Erie, Pa	66,525
Decatur, Ill	31,140
Dallas, Texas	92,104
Akron, Ohio	69,067
Quincy, Ill	36,587
Evanston, Ill	24,978
New Brunswick, N. J	23,388

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* U. S. Census for 1910.

The question has been agitated at numerous other places, the chief cities being those on the Great Lakes, including Milwaukee, Cleveland and Detroit.

STERILIZATION OF WATER: PROGRESS AND LIMITATIONS OF PROCESSES.

The possibility of the sterilization of water by means of hypochlorite of lime, or other similar chemicals, has been known for many years and it has been experimented with and used to a limited extent abroad. Its first application on a large scale for the purification of a municipal water supply in the United States was at the Boonton reservoir of the Jersey City Water Supply Company in 1908. Its use at that time and place brought it conspicuously before the public, owing to the fact that it was made the principal argument in an important litigation in the courts. Following this it came into general use in every part of the United States and Canada, until at the present time it may be said, without exaggeration, that where a municipal water supply is subjected to treatment of any kind, the use of hypochlorite is almost always a part of that treatment. This very general use is quite justified by the results obtained.

A great accumulation of evidence shows beyond doubt that it is a very cheap and quite effective method, generally speaking, for destroying certain of the dangerous elements of a polluted water supply, and every credit is due to those who first adapted it to this use and to those who have developed it to its present state.

The tendency at first was to regard this as a panacea for all troubles arising from polluted water supply, but this tendency was not very long lived. It soon was made apparent to those who had taken the lead in the development and use of this method that it had well-defined limitations, and that, while it was most useful and efficient under proper conditions, if these limitations were overlooked it was likely to be inefficient and disagreeable to the water consumers. A portion but not all of these limitations were related by Mr. George A. Johnson in a paper before the Milwaukee meeting of this Association in 1910.

The treatment of water by hypochlorite does not remove turbidity nor color, nor organic matter to any appreciable extent, nor does it remove objectionable tastes or odors. Suspended matter in the water to be treated interferes seriously with the efficiency of the treatment by the absorption of a considerable part of the chemical in the suspended matter, and also by the fact that the chemical does not affect the bacteria which may be enfolded with particles of suspended matter.

Latterly it has been recognized more and more that the treatment fails to destroy certain kinds of bacteria which, owing to their spore-forming characteristics, are very resistent to the toxic effect of the chemical. There is considerable evidence, too, to indicate that this treatment, as applied in the United States, does not actually destroy all of the bacteria, but simply stuns them or drugs them for a time, or in other words, has a toxic effect which prevents them, for the time being, from developing on the ordinary culture media.

That hypochlorite has a disagreeable taste and odor is, of course, commonly known. The quantity in which it has to be applied to produce the desired effect in a polluted water is very small; ordinarily small enough so that it does not impart any of this taste or odor to the water treated. Every water, however, has its own limitations in this respect, and experience with a number of waters has shown that practical difficulties sometimes arise in producing the effect desired without leaving the water with seriously objectionable qualities. In such cases the treatment has to be under an unusually careful chemical supervision to prevent offensive conditions. Treatments have been developed and applied which are designed to remedy such offensive tastes and odors, but are not yet generally used for the reason probably that they are not frequently needed. The treatment in this country differs radically from the treatment in Europe in this respect. In some places abroad the dose is relatively heavy, imparting to the water an excess of the chemical and an offensive taste, and after a short period of contact a corrective is applied to remove this excess and to eliminate the objectionable taste. In the United States, on the other hand, the aim has been, in general, to apply only so much, or rather so little, of the chemical as will produce the desired bacterial reduction without imparting any objectionable tastes, and to a large extent this has been successfully accomplished.

From the foregoing it will be seen that hypochlorite treatment must not be considered as a substitute for other established means of water purification. It is valuable, indeed, in many emergencies, and valuable always as an adjunct to filtration. In some waters which are unusual in their freedom from suspended and organic matter, it may be considered all-sufficient, but the principal applicability of the treatment is for emergency use or as a finishing process after filtration.

Liquid Chlorine. The use of liquid chlorine as a sterilizing agent has recently come to public notice. At the present writing its use has not become general enough to afford decisive evidence that it will have the same practical success that the hypochlorite treatment has had. Its advocates make very promising claims for it and the little evidence that has been presented to the public indicates that it is worthy of careful consideration and study. It is said to be quite as efficient, if not more so, than hypochlorite and so far as the chemical itself is concerned, is also said to be more economical.

Ozone. Ozone, which is a combination of oxygen in one of its most readily available forms, has long been known as a good disinfectant. Much experimenting has been done to make it applicable to the sterilization of water. The results of laboratory experiments along this line offer an alluring prospect, as there is no doubt that under proper conditions ozone has the power to completely destroy bacterial life in water. The commercial application of ozone has been industriously pursued by a number of these experimenters, but the evidence seems to show that they have met with certain difficulties hard to surmount if it is to compare favorably in all respects with other means of sterilization. Principal among these is the difficulty of obtaining a thorough and intimate mixture of the ozone gas with the water to be treated, to be sure that a suitable amount of the gas comes in contact with every particle of water, and of the interruptions in the continuity of performance of the ozonizer. Another difficulty seems to have been the high cost of the treatment when compared with the modest cost of hypochlorite. Also, the treatment is not applicable to water which contains turbidity or organic matter as the presence of these interferes with its efficiency.

Violet Rays. Somewhat the same remarks may be made about the use of violet rays for the sterilization of water as those given above regarding ozone. Its use has been advocated and its success, on a laboratory scale, has been well demonstrated but its excessive cost, its complicated nature and the difficulty of making it applicable to the treatment of large volumes of water, together with the other general limitations already referred to, do not at present promise well for its commercial success.

An unusual opportunity presents itself to this Association to make a comprehensive study of the whole subject of the sterilization of water in the present state of the art.

This should aim to bring out data as to the rate of application, and how it is affected by such conditions as color, turbidity, temperature, etc.; data as to limitations by which actual experience has shown it to be affected, such as reduced efficiency due to the presence of turbidity or color, limits to the amounts that can be applied to any water as governed by æsthetic consideration, inability to destroy certain types of bacteria, such as spore formers, apparent revivification of bacteria after prolonged period of growth on culture media and the possible bearing of this subject upon the hygienic efficiency of the treatment, reduced efficiency due to the presence in the water of reducing agents, etc.; data as to experience with other disinfectants than hypochlorite of lime, such as hypochlorite of soda, hypochlorite prepared electrolytically, liquid chlorine, ozone, violet rays, etc.

THE ECONOMICAL ADVANTAGES OF DECOLORIZING SOFT WATER THROUGH AN OVERDOSE OF COAGULANT AS PRACTISED AT SPRINGFIELD, MASS.

The use of aluminum sulphate for the removal of coloring matter from water has become familiar through the development of modern mechanical filters. It has been practised successfully for many years and has come to be looked upon generally as the logical and most easily applicable remedy for the objections arising from the presence of vegetable stain.

Experience that has been corroborated with the majority of municipal supplies subjected to this treatment has indicated that a color of 100 in some cases may be removed, to a satisfactory degree, by the application of about two grains per gallon of aluminum sulphate. This ratio varies somewhat with individual cases. The color of some waters is discharged quite easily, while others, particularly the hard waters, resist the action to a considerable extent.

As a rule, decolorization is not the primary purpose of the application of coagulant to municipal water supplies. It is more commonly an incident of a treatment, the principal object of which is to remove bacteria which are detrimental to the health. In the practical operation of filter plants, however, the satisfactory elimination of the color dissolved in the water implies an efficient removal of the bacteria as well, and thus it happens that the color of the filtered water is often made to serve as the criterion by which to judge of the satisfactory action of the coagulation treatment.

Cases are uncommon of municipal supplies in which coagulation is resorted to solely for its decolorizing properties. Springfield, Mass., is one of these. When the new water supply for the city of Springfield was developed a few years ago, provision was made for the occasional application of aluminum sulphate, primarily for the purpose of color removal at times when the raw water had a relatively high color. In the practical handling of this treatment it was discovered that the desired decolorizing effect could be produced with entire satisfaction by dosing the water intermittently. The coagulant is applied as the water enters the sedimentation basin. This continues for several hours, the water thus treated mixing with the water previously contained in the basin which, owing to the intermittent application, may be assumed to have received an insufficient dose of coagulant, or perhaps none. The entering water has received an application of coagulant which virtually amounts to an overdose for the water thus treated. Upon mixing after a proper predetermined period of treatment, action takes place which results in a satisfactory reduction of color throughout the whole mass, and with an average application of coagulant which is unprecedentedly low for working conditions. During seven months of 1912 an average application of 0.23 grain per gallon of aluminum sulphate reduced the color from an average of 37 in the raw water to 15 in the filtered water.

The chemistry of coagulation is very complex. Formulæ are often written in the conventional manner purporting to represent the changes that take place upon the application of aluminum sulphate to water. They may be true as far as they go, but it is safe to say that they do not tell the whole truth. It has long been recognized, for instance, that a considerable proportion of the chemical may go quite unaccounted for in this reaction so far as effective work is concerned. It is a fact too that decolorization may take place, and in fact does take place, with the expenditure of smaller amounts of coagulant if there is no alkalinity present, whereas the conventional formulæ include alkalinity as one of the essential factors of the reaction.

Mr. George C. Whipple, in a discussion of the subject of "Decolorization of Water," before the American Society of Civil Engineers in 1901, pointed out the fact that less coagulant was required to discharge a given color from soft water than from hard, and that instead of two grains of sulphate of alumina to remove a color of 100, only about 0.7 grain was required if there was no alkalinity present.

It is believed that two factors contribute to the success of this intermittent treatment under Springfield conditions.

First, the water is very soft, having an alkalinity which averages hardly more than 10 parts per million.

Second, the sedimentation basin, in which the mixing of coagulated and uncoagulated waters takes place, has a capacity much greater than is commonly found in coagulating basins of mechanical filter plants, namely, about 40,000,000 gallons per day for an average daily flow of slightly more than 10,000,000 gallons. This gives ample time for the reactions which result in the discharge of the color. In the presence of ample amounts of substances involved, the interchange between alkalinity in the water and the coagulant, as indicated by the conventional formulæ, takes place reasonably quickly with consequent prompt decolorization;but the obscure reactions involved in decolorization in the absence of alkalinity or in the presence of only small amounts of alkalinity or coagulant, are very slow.

This method of treatment is suggestive of possibilities in the direction of economy in the decolorization of water where conditions favor it, and is a matter which is deserving of careful study wherever the opportunity presents itself. The success of the method depends upon more or less obscure laws of physical chemistry, which it is hoped may be explained more fully in their bearing upon this question in the discussion by those who developed this method of treatment.

DECOLORIZATION AS AN ADJUNCT OF WATER SOFTENING.

During the past year the water softening plant at Grand Rapids, Mich., has been put in service. It deals with a highly colored and moderately turbid water, having a total hardness of about 250 parts per million. The incrustants or permanent hardness amount to only about 30 parts per million.

It was the original intention with the Grand Rapids project to secure a water having a total hardness of roughly 120 parts per million, or approximately that of the water of the Great Lakes. It has been frequently spoken of as the so-called "Lake Michigan" standard.

No soda has ever been used at the Grand Rapids plant, but there is applied about one-half grain or so per gallon of sulphate of alumina to the softened water in order to lessen the turbidity of the water reaching the filters.

The most interesting feature of the Grand Rapids project is that the lime which is used for softening the water also succeeds, through the removal of magnesia, in reducing the vegetable stain to a point as low as that which could be secured at much greater expense by the application of sulphate of alumina. In other words, a highly colored water that is hard is reduced in color to less than 10 parts per million with the use of lime and its total hardness is reduced to less than 100 parts, all at a cost of less than would be required for treatment with sulphate of alumina to secure equal decolorization.

The use of excessive quantities of lime, such as proposed at London by Dr. Houston, for sterilizing water supplies, has not been tested in this country so far as we know. In such a project as that at Grand Rapids it is feasible, however, to secure a high degree of bacterial removal by applying all of the lime to a portion of the water to be filtered. Then the lime-treated water is mixed before filtration with the remainder of the supply which can be sterilized with hypochlorite of lime. The additional possibilities of treating the supply along these lines have not been worked out, but offer a promising field for practically complete sterilization of hard waters at a cost not above that for softening as ordinarily applied.

Corrosion of Metals.

During the past few years technical knowledge upon this subject has increased materially as is also true of observations as to practical experiences.

In general, hard waters have given little or no trouble in corroding metal pipes apparently-due in considerable measure to the formation of protective coatings upon the metal by the water itself.

Soft waters do not seem to form naturally such coatings and, therefore, allow the carbonic acid in the water to dissolve such metals as iron and to retain the iron in solution. This process is carried on through the presence of atmospheric oxygen in the water ultimately to a point where all of the oxygen is utilized by the dissolved metal.

Waters which have been softened through the use of lime and from which the free carbonic acid has been removed seem to give little or no trouble so far as attacking iron is concerned. If there should be an excess of lime water used, on the other hand, there is some likelihood of corrosive tendencies noticeable particularly with respect to zinc and galvanized surfaces.

The Water Department of New York City has studied recently and at great length the corrosive properties of the Croton water, particularly as influenced by the use of sulphate of alumina for purposes of decolorization. The free carbonic acid naturally present in such surface waters as the Croton supply is increased somewhat by the carbonic acid liberated through the application of sulphate of alumina. As small quantities of free carbonic acid, however, seem sufficient to institute corrosive tendencies of the water upon iron, the effect of added quantities, resulting from the use of sulphate of alumina, has been comparatively small.

A large share of the investigations has been devoted to the use of lime or soda to remove free carbonic acid and thus reduce the corrosive tendencies of the water. In fact, this process judiciously applied seems capable from laboratory experiences of forming coatings on the inside of a pipe system so that corrosion may be practically neglected.

Clear waters, such as those coming from underground sources and filtered surface waters, show an amount of iron dissolved from the piping which is probably no greater than that which occurs with many turbid and colored surface waters. But when the latter are used in an untreated condition the effect of corrosion seems to have been largely obscured by other physical characteristics. Hence the rapid increase in the use of filtered water has developed the need for additional care in the study of filtration projects.

The New York City investigations above mentioned were conducted by Drs. Jackson and Hale of the Mount Prospect Laboratory of the Water Department, and the same will appear in full in the 1912 Report of the Department.

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DISCUSSION ON CORROSION OF METALS.

FRANK E. HALE.

The question of corrosion of iron pipes by water supply was given an extended investigation of six months at Mt. Prospect Laboratory during the first half of 1912. These experiments are the basis for the following discussion.

CHEMICAL REACTIONS.

In order to understand the problem it is necessary to have a clear conception of the chemical reactions taking place. While the electric theory of solution tension of iron may be correct as the ultimate source of corrosion it is my belief that the cart has been put before the horse and that the electrical phenomena result from the chemical action. Certain it is that the presence of carbonic acid is the most potent factor, coupled with the presence of dissolved oxygen. The action of these two agents is modified by the presence of other salts, increased by nitrates which furnish oxygen by reduction, decreased by carbonates which help to form protective coatings upon the pipe.

The chemical action takes place in the following order:

Solution as bicarbonate. The first reaction is the solution of iron as bicarbonate by carbonic acid with the formation of hydrogen.

$$Fe+2\ H_2CO_3=FeH_2(CO_3)_2+H_2$$

Formation of hydrogen. The dissolved oxygen in the water which is near the iron surface oxidizes some of the hydrogen back to water. After the oxygen near the iron is used up the hydrogen remains as a gas. In the cold reaction of our experiments the amount of hydrogen oxidized was found to be about 20 per cent.

Oxidation and precipitation of dissolved iron as Fe_2O_3. The dissolved oxygen at the same time oxidizes the soluble iron bicarbonate to insoluble red iron oxide setting free again the carbonic acid.

$$4\ FeH_2(CO_3)_2+O_2+4\ H_2O=2\ Fe_2O_3+8\ H_2CO_3$$

Catalytic action of carbonic acid. The carbonic acid, set free, again dissolves more iron and is again set free until all of the dissolved oxygen is exhausted.

Oxidizing power of Fe_2O_3. The red iron oxide then acts as oxidizer until it is completely reduced to black magnetic iron oxide, setting free carbonic acid again.

$$FeH_2(CO_3)_2+Fe_2O_3+H_2O=Fe_3O_4+2H_2CO_3$$

Final product is Fe_3O_4. Reduction does not take place beyond this stage. These iron products are expressed in the equations as oxides although differences of color, red, green, brown and black, coupled with varying stability on standing exposed to air, indicate that they probably exist as hydrates, with the exception of the final black magnetic oxide obtained by hot action.

Nitrate as source of oxygen. After all dissolved oxygen has been used up nitrates are completely reduced to ammonia serving to supply oxygen.

$$HNO_3+H_2O=NH_3+O_2$$

Final action of carbonic acid. After all possible sources of oxygen are exhausted, the carbonic acid dissolves more iron, which is probably thrown out of solution finally as insoluble basic carbonate of iron, since after complete reaction there is only about 0.2 to 0.7 p.p.m. iron in solution, no free carbonic acid, no dissolved oxygen, no nitrate, sometimes no bicarbonic acid, and under some conditions caustic lime is present. The alkalinity of hard waters is reduced to about 25 p.p.m.

Sources of dissolving or active carbonic acid. The carbonic acid for the solvent action may be derived from three sources, the free carbonic acid, the bicarbonic acid, and the neutral carbonate. In the latter case the carbonate hydrolyzes so that there are in solution neutral carbonate, lime hydrate, and carbonic acid. This takes place when the water reaches the stage that only neutral carbonate is present. The carbonic acid set free dissolves the iron. The presence of lime hydrate was proven by titration with phenolphtalein and methyl orange.

Source of active carbonic acid affects rate of corrosion. The rapidity of corrosive action is affected by the source of carbonic acid in order as given above, and the amount of soluble iron present during the active stages of corrosion varies with the above order of source of carbonic acid.

Carbonic acid set free by alum. Another source of carbonic acid is that set free in alum treated waters. This is really mostly bicarbonic acid set free. The amount set free per grain of alum per gallon is not as sometimes stated 6.8 p.p.m. but about 3.5 p.p.m. (determined by analysis). This is probably due to the formation of a basic carbonate of aluminum, $AlCO_3(OH)$, rather than the hydrate, $Al(OH)_3$. The compound formed probably varies somewhat with the temperature and may be mixtures of $AlCO_3(OH)$ and $Al_2(CO_3)\ (OH)_4$. Probably $Al(OH)_3$ forms only upon boiling, as in chemical analysis. The amount of free carbonic acid given, 3.5 p.p.m., agrees with the results obtained at the Little Falls Filter Plant.

It must be understood that the facts as given above apply to new pipe with a *clean iron surface* and to *complete reaction.*

Water as a source of oxygen. Attempts to remove dissolved oxygen from water appear to me to be hopeless as well as expensive, because a consideration of the above reactions brings out a fact that seems to me to have escaped general attention, and that is that 75 per cent. of the oxygen in the iron oxides formed by complete reaction, if all the hydrogen were set free, comes from the water and not from the dissolved oxygen, and the greater part of the hydrogen is set free.

Large amount of iron corroded relative to amount of dissolved oxygen. A very large amount of iron is corroded for each part per million of dissolved oxygen through the catalytic action of carbonic acid and water. For example 10 p.p.m. of dissolved oxygen produces 126 p.p.m. Fe_3O_4, expressed as Fe, whereas if the hydrogen were oxidized and not set free, the amount which 10 p.p.m. oxygen could produce would be only 31 p.p.m. iron. In our experiments 75 per cent. to 80 per cent. of this theoretical amount of iron was produced, the difference from theory being due to oxidation of hydrogen. This is a variable quantity, but about 85 per cent. of the hydrogen oxidized was oxidized during the first fifteen minutes, which substantiates the idea expressed previously that oxidation of hydrogen takes place only at the surface of the iron while dissolved oxygen is present near the iron. The presence of hydrogen gas is easily shown and has been proven by many investigators. Any hydrogen set free means an equivalent amount of oxygen obtained from the water to oxidize the iron.

Effect of kind of iron relative to complete reaction. The experiments were carried out with Byers wrought iron pipe (protected with an inside coat), Reading wrought iron, Black mild steel, and galvanized wrought iron. The first three showed no differences in the corrosive action when carried to completion, but the steel appeared to corrode most rapidly. The galvanized iron showed great resistance at first, but gradually, especially with alkaline water, the action increased somewhat, though in the time of our experiments the highest amount was only about one-third that of the other pipes.

Rate of Corrosion.

Remarkable speed of reaction. Experiments with regard to speed of reaction brought out some surprising facts.

About 50 per cent. of the iron produced by corrosion in the cold is produced in two to three hours. With Croton water (5 p.p.m. free carbonic acid) the action is practically complete in fifteen hours.

Morning rust and new service. This explains the greater tendency in house services, especially in new services, to show rusty water when first drawn in the morning, since the action is complete over night.

Influence of carbonic acid upon rate of corrosion. The rate of corrosion is increased proportionately to the increase in free carbonic acid. The action cold was complete in seven to eight hours with Croton water containing 25 to 50 p.p.m. free carbonic acid. The total iron was also somewhat increased with the higher free carbonic acid.

The carbonic acid hastens the action by dissolving the iron more rapidly. There being more iron in solution, oxidation is hastened. Analyses for soluble iron and dissolved oxygen proved this to be true. The carbonic acid increases the total iron by forming more basic carbonate of iron which is left unoxidized after available oxygen is exhausted.

Alum-treated water showed no appreciably greater corrosive action either in speed or total amount of iron than untreated water. This is due to the comparatively slight increase in free carbonic acid (3.5 p.p.m. per grain of alum per gallon).

Retardation of rate of corrosion by neutralization of carbonic acid. Neutralization of the free carbonic acid by lime hydrate or by sodium carbonate retards the corrosive action.

Neutralization of the free and half-bound carbonic acid by lime hydrate, provided there is no excess caustic, still further retards the corrosive action, and also reduces the total iron produced by cold action 33 per cent. and by hot action 50 per cent.

Neutralization of carbonic acid retards corrosion by reducing the amount of dissolving agent, hence the amount of soluble iron present at any moment and thus slows up the oxidation.

Increased rate of corrosion caused by a slight excess alkali. The slightest excess caustic (a few p.p.m.) up to considerable excess hastens corrosion to almost identically the same degree as does increasing the free carbonic acid to 25 to 50 p.p.m. A large excess of soda ash acts likewise. This action of alkalies has been noted by Cushman and others.

Excess alkali hastens the corrosion by hastening the absorption of oxygen by the iron in solution, though this is smaller in amount at any time. Until the excess of alkali is sufficient to prevent hydrolysis of carbonates the corrosion takes place. Analyses proved that the oxygen is absorbed faster and that only traces of iron are in solution at any time. Compare in this connection the Levy method of determining dissolved oxygen in water, *i.e.*, oxidation of ferrous salts in alkaline condition.

Amount of excess caustic necessary to completely stop corrosion. The excess of alkali necessary to stop corrosion completely is 100 to 125 p.p.m. excess lime hydrate over that needed to neutralize the free and half-bound carbonic acid. Only slightly more is needed to stop corrosion hot than cold. This amount of excess alkali acts by completely preventing solution of iron, for the oxygen still oxidizes the surface of the iron and is completely gone in 24 hours, although no iron over the original amount appears in the water.

The above facts show that whatever helps to put iron into solution is the real cause of red water trouble. It is the iron in the water, dissolved or suspended, which causes trouble, not the iron clinging to the pipe.

Heat hastens rate of corrosion. All corrosive action was hastened by heat (120°–150°F.) so that complete reaction was accomplished in 1½ to 3 hours on the clean iron surface.

Heat hastens corrosion in at least four ways,—by hastening the chemical action of solution of iron, by increasing the amount of free carbonic acid since heat sets free the half-bound carbonic acid of the alkalinity, by creating convection currents that cause the dissolved iron to diffuse more rapidly and hence come in contact with the dissolved oxygen faster, and by hastening the oxidation and precipitation chemically of the dissolved iron.

Action of hard water. The water of the Flatbush Water Company, which has a hardness of about 140 p.p.m., contains only two-thirds as much oxygen as Croton water and 10 p.p.m. free carbonic acid, produced corrosion as rapidly as Croton water on the clean iron surface and a total amount proportional to the oxygen and carbonic acid content as required by theory. Yet in service this water causes no complaint and is generally free from iron and turbidity. This is undoubtedly due to protective scale formed on the pipe, probably consisting of both iron oxide and carbonate of lime. As previously stated the alkalinity of hard waters is reduced to about 25 p.p.m. when the action goes to completion.

Consumption of oxygen as related to speed of corrosion. Dissolved oxygen disappears rapidly in all cases. In the first fifteen minutes 23 per cent. to 37 per cent. were used up due to oxidation of both hydrogen and dissolved iron.

The relative speed of oxidation is best seen in comparing percentages of oxygen used up in 1½ hours.

Temp.	*Croton water*	*Free CO_2*	*Bicarbonic acid*	*Lime hydrate excess*	*Oxygen used up.*
1 hot	untreated	5 p.p.m.	10 p.p.m.	....	100%
2 cold	modified	0 p.p.m.	0 p.p.m.	27 p.p.m.	87%
3 cold	modified	25 p.p.m.	10 p.p.m.	....	87%
4 cold	untreated	5 p.p.m.	10 p.p.m.	....	78%
5 cold	modified	0 p.p.m.	10 p.p.m.	....	75%
6 cold	modified	0 p.p.m.	0 p.p.m.	....	68%

It is noticeable that the increases of dissolved oxygen used up in No. 3, No. 4 and No. 5 is approximately proportional to the increases in free carbonic acid in the water.

Relation of oxygen to color and composition of precipitate. So long as there is oxygen in solution the reactions take place rapidly and almost proportional to time and the iron precipitate is red (Fe_2O_3). After exhaustion of the oxygen the reaction becomes slower, the red oxide being reduced to the lower black oxide, turning green to brown to black. The color of the precipitate gives a good indication of the progress of the action.

Relation of oxygen and carbonic acid to soluble iron. While there is dissolved oxygen present there is iron in solution depending upon the amount of active carbonic acid. Soon after the oxygen disappeared it was but rarely that more than 0.5 to 1.0 p.p.m. iron was in solution. The amount of soluble iron present while dissolved oxygen was present was as follows:

Croton water	*Free CO_2*	*Bicarbonic acid*	*Lime hydrate excess*	*Soluble iron*
modified	0 p.p.m.	0 p.p.m.	27 p.p.m.	0.35 p.p.m.
modified	0 p.p.m.	0 p.p.m.	....	0.76 p.p.m.
modified	0 p.p.m.	10 p.p.m.	....	3.50 p.p.m.
untreated	5 p.p.m.	10 p.p.m.	....	5.50 p.p.m.
modified	25 p.p.m.	10 p.p.m.	....	7.90 p.p.m.

It is obvious that the amount of dissolved iron is greater with increase in the active carbonic acid.

Relation of amount of oxygen to corrosion. The amount of oxygen within wide limits does not seem to affect the *rate of corrosion* materially, but the total amount of iron removed from the pipes in complete reaction, other factors remaining the same, is directly proportional to the dissolved oxygen in the water.

PROTECTIVE COATINGS.

When iron pipe is exposed to the continuous action of water, as in service, a protective coating forms according to the nature of the water.

Coating delays corrosion. Its action is to delay corrosion rather than to stop it and to reduce the amount of iron appearing in the water. The corrosion goes on slowly but the oxides cling to the iron increasing the amount of scale.

Protective character of coating varies with the water producing it. In cold action the greatest protection was acquired experimentally in ten days and then remained constant. Flatbush and Brooklyn waters caused a better protective coating than Croton water. The iron produced in 24 hours dropped from 114 and 85 p.p.m. respectively for the two former to 21 p.p.m. Fe., for the Croton and its modifications from 56–102 to 29–36 p.p.m. Fe. Croton was tried in four modifications,—untreated, with free carbonic acid neutralized by sodium carbonate, with free carbonic acid neutralized by lime hydrate to bicarbonate, and treated with one grain per gallon of alum.

In hot action the protective coating formed in two days. Flatbush water reached the lowest level of 3 p.p.m. iron with an average of 8. Brooklyn water reached 4 p.p.m. iron with an average of 9. Untreated Croton fluctuated high and low with an average of 41 p.p.m. iron. The alum treated Croton averaged 26. The soda neutralized Croton averaged 15 with a minimum of 11, and the lime neutralized Croton averaged 23 p.p.m. Fe. All the averages, cold and hot, include results from the tenth to the twenty-first day.

Action of carbonic acid upon pipes with coatings. The pipes which had acquired a protective coating from these different waters were subjected for 24 hours to the action of untreated Croton water and to Croton water containing 20–27 p.p.m. free carbonic acid.

The water with increased carbonic acid produced an average of 38 p.p.m. iron from the pipes with scale formed in cold action against 24 p.p.m. produced by untreated Croton (5 p.p.m. CO_2). On the pipes with scale produced in hot action about the same relative quantities were produced, 34 against 22 p.p.m. Fe., showing that water containing the greater amount of carbonic acid causes more corrosion upon pipes protected by scale.

The scale produced by Flatbush, Brooklyn, and soda neutralized Croton water proved the more protective.

GENERAL SUMMARY.

Extensive corrosion takes place rapidly in new pipe while the iron is fairly clean from incrustation. This explains the abundance of complaints of iron rust in new service installation.

Concerning the kind of pipe there is little doubt that steel pipe is most readily attacked, wrought iron next, and galvanized iron the least. The latter is far preferable for use. Lead pipe should never be used any more than absolutely necessary because of the danger of accumulative poisoning with minute amounts of lead (less than 0.5 p.p.m.).

The chief agent in dissolving the iron is carbonic acid, as it is also the chief agent in holding iron in solution.

The chief agent in carrying the rusting to the greatest extent is oxygen.

Through the catalytic action of active carbonic acid, about 70 per cent. of the oxygen in the iron rust comes from the water by chemical decomposition, hydrogen gas being set free. The remainder only, about 30 per cent., is furnished by the dissolved oxygen in the water.

Waters which give the most trouble are very soft and contain considerable free carbonic acid.

Hard waters rarely cause complaint as they form an excellent protective coating on the pipes.

The action in distribution services probably never reaches completion on account of protecting scale of oxide, etc., which retards corrosive action. The scale varies with different waters in protective properties. Tap samples in New York City have shown no appreciable diminution in dissolved oxygen or in free carbonic acid, so that only slight corrosion can have taken place in proportion to volume of water and possible reaction. Even hot services have shown the usual amount of carbonic acid and more oxygen than would saturate the water at the temperature when drawn.

Since in distribution services there is no exhaustion of oxygen, any increase in free carbonic acid may mean a possible increase of soluble iron in the water, which would be precipitated in the hot water supply.

Neutralization of free and half-bound carbonic acid is impracticable as it tends to hasten corrosion if there be the slightest excess of hydrate, removes zinc when hot from galvanized pipe, interferes with alum precipitation and color removal, and produces considerable precipitation of calcium carbonate in the water, which would deposit in the pipe system, meters, etc., unless previously removed by filtration or sedimentation.

Neutralization of only free carbonic acid is feasible, since it retards corrosion and reduces the amount of soluble iron

Either soda ash or lime oxide may be used. Both reduce the corrosive action, cold or hot. Only sufficient lime should be used to form bicarbonate. This reagent increases the hardness 1.1 p.p.m. for every 1 p.p.m. free carbonic acid neutralized to bicarbonate. About 5.3 pounds CaO per million gallons of water are required for each 1 p.p.m. carbonic acid. It is best handled dry. It costs about two cents per million gallons per 1 p.p.m. carbonic acid.

Soda ash is more soluble, can be handled in concentrated solution and consequently in small sized tanks, and probably with better regulation of dosage, would not increase the hardness, but on the contrary would decrease the lime sulphate in the water, changing it to sodium sulphate, thus improving the water for boiler use and for other industrial purposes. It also apparently helps to form a better protective coating on the pipe. About 20.2 pounds soda ash per million gallons of water are required for each 1 p.p.m. carbonic acid. This would cost about 20 cents per million gallons for each 1 p.p.m. carbonic acid. Soda ash has been used successfully on a small scale to obviate red water trouble. The great difference in cost is due to greater molecular weight, less combining power, and greater cost per pound. The cost must be considered in connection with the degree and advantage of the change of sulphates to carbonates, etc.

Aeration of water by splashing followed by neutralization of residual free carbonic acid (about 5 p.p.m.) is probably the best practice.

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PREVENTION OF IRON CORROSION.

W. F. MONTFORT.

In his original paper in 1903, Whitney (1) laid the foundations of the electrolytic theory of corrosion of iron and stated the rationelle of rust prevention by reducing the concentration of hydrogen ions in pure water, or the introduction of some substance which should increase the concentration of hydroxyl ions.

Prior to this publication Adams (2) in 1900 had shown that the addition of 56 grains of sodium carbonate, or 43 grains of ammonia (NH_3), or 5 grains of sodium oxide per gallon were required to wholly prevent the rusting of iron on water.

Still earlier Fuller, in reports on experiments in purification of Ohio River water at Louisville and at Cincinnati, published in 1899, suggested that the increased corrosive character of water coagulated with sulphate of aluminum might be corrected by addition of lime.

The practical application of lime for prevention of corrosion in cases of localized "red water" seems to have antedated Whitney's paper, since experimental work on removal of carbon dioxide and iron from water mains as a preventive of the development of crenothrix by treatment with lime had been carried on before 1903. In a communication to an engineering journal Milligan (3) refers to lime treatment for crenothrix at Freeport, Ill., described in detail by E. C. Smith (4) and O. T. Smith (5) and mentions further sundry other occurrences of "red water" which had been successfully obviated by application of lime. Dates and details of these applications in New England, New York City and Philadelphia are not given.

In England the addition of chalk in treatment of very soft waters has been practised for many years. If added in a quantity slightly in excess of that required to unite with carbon dioxide as bicarbonate the normal carbonate dissolves, giving hydroxyl ions.

Theoretically and practically this addition of hydroxyl ions, whether from lime or from hydrolyzed calcium carbonate, results in a more or less complete inhibition of corrosion, when dissolved carbonic acid is the sole agent increasing the concentration of hydrogen ions.

In the later discussions of red water in a staff article in *Engineering Record* (6), by Weston (7), Ledoux (8), and Fuller (9) frequent reference is made to this occurrence in specific waters more or less impregnated with organic matter. Unfortunately color determinations are not always recorded. And while the elusive nature of these obscure compounds makes difficult the discussion of their bearing upon the question of corrosion, the importance of these factors may not be disregarded.

An interesting discussion of the experimental use of lime and of soda ash upon various waters in iron pipes after seven days' contact for cold waters at 50 to 70° F. and three days' for hot water at 125 to 135° F., by Clark and Gage (10), is summed up as follows:

"The investigation is not yet finished, but it is evident that those so far made have given results that are in accord with observations in various parts of the country: namely, that when soft waters are purified by coagulants and mechanical filters, they have a greater corrosive action upon iron than before purification and greater than the same supply when filtered through sand, and that increasing the hardness of mechanically filtered water to a reasonable degree has little effect upon corrosion."

These were supplies of high and of moderate color. The specific nature of the organic matter is not stated, nor is the color recorded in the report. Data are wanting as to the amount of lime or soda ash added, and the presence of hydroxyl ions in the samples tested is not affirmed.

Ledoux states (8) that the swampy water of Charleston (S. C.) supply is highly corrosive before filtration; the removal of most of the organic matter by treatment with sulphate of alumina and filtration reduces the corrosive effect to a minimum. The color may not be entirely removed without the addition of an excess of aluminum sulphate sufficient to cause corrosion, which can, however, be eliminated by the application of lime, at a sacrifice of color reduction. As pointed out by Mr. Weston (7) there is no statement of the experimental addition of lime after successful color elimination and filtration. Nor is there a statement of the relative alkalinity toward phenolphtalein and erythrosin to suggest the presence of more or less hydroxyl. There is a possibility that the corrosive character of this water was principally due to dissolved carbon dioxide, and that the presence of hydroxyl ions was all that the filtered water demanded to insure against corrosion.

Some interesting observations of protective organic matter are given by Mr. Weston and confirmed by Messrs. Clark and Gage, which suggest that the reduction in quantity or change in the quality of organic matter by filtration may induce corrosion.

Mr. Weston (7) cites the case of lead service pipes at Concord, Mass., under observation for ten years, where no more corrosion appeared in 1910 than in 1900, and that of Exeter, N. H., which had been for four years supplied with filtered water, always alkaline and free from sulphate of alumina, where there had been some complaints recently (1910) of "red water" in hot-water systems. This he considers may be due in part, as at Springfield, to the poor quality of pipes and tanks, referred to by Mr. Whipple (11), but Mr. Weston ascribes it in great part to the removal of organic matter by filtration. "The effect of filtering such water is like changing from a colored surface to a clear ground-water supply. This change has been known to increase corrosion. Slow sand filters might effect an equal or greater increase in the amount of carbonic acid, but because the removal of organic matter would not be so complete, it is probable that there would be more protection afforded by organic matter collecting on the insides of the pipes. In the writer's opinion most of the increased corrosion of pipes ascribed to filtered water is due to the withdrawal of organic matter which would form a protective coating."

This acceleration of corrosion follows not only coagulation and mechanical filtration, where the effect might be attributed to the increase in carbon dioxide and the greater conductivity of water treated with a coagulant; the effect is noted, though in less degree, after filtration through sand, without coagulant. The organic matter which is protective for any reason is most readily removed by filtration; the residual matter, whether originally different in character, is different in its behavior when left alone. There is room for discrimination in the varieties of organic matter in colored waters, before the whole question of corrosion can be understood.

The discrimination which is made in regard to the behavior of colored waters during coagulation is suggestive. It is a matter of common experience among operators where coagulation of colored waters is practised, that generally a certain proportion of the coloring matter is removed with ease; that when color is higher a proportionate increase in the charge of alum is not followed by corresponding effectiveness; that in some cases of moderately high color addition of alum gives no visible floc though the alkalinity present is sufficient to react with the full dose of alum used.

Oxidation of freshly prepared leaf extract by potassium permanganate is difficult, although readily carried to completion after some months of standing. The determination of oxygen consumed in colored waters from the Upper Mississippi drainage area is sometimes very slow, requiring unusually prolonged digestion for complete color reduction. There seems to be a residue of organic matter not readily attacked by oxidizing agents until after months of exposure to air and light at ordinary temperatures.

It has occurred where iron sulphate and lime were used in treatment of such a water, having a color of 90, with the addition of lime to produce a caustic reaction (alkalinity toward phenolphtalein, 62, total, 116), a color of 35 parts per million persisted, and 2 to 3 parts per million of iron remained in solution. When this water was heated to about 150° F. in hot-water pipes there was developed the red color of ferric hydroxide. In this case the precipitation of iron by an excess of hydroxyl was incomplete at ordinary temperatures, and only prolonged digestion with dissolved air served to remove it from solution.

The failure of alum to give a precipitate with abundant alkalinity, and of ferrous sulphate in the presence of hydroxyl ions, suggests the formation of complexes like those little ionizable alcoholates with metal ions, formed by citrates, tartrates, sugars, and the like, which necessitate special procedure in analytical determination of iron and aluminum.

Glucosides freshly derived from vegetables tissues (13) would suggest themselves as the possible agency in this retarding action, while their decomposition products might assist in furnishing the protective matter which accumulates with organisms in the slimy coating of old pipes as well as on sand grains of filters.

It would be interesting to have experimental results on precipitation of iron ions with increasing hydroxyl concentrations in some of the most studied "red water plague" spots, to ascertain whether there is not some organic matter present which acts in a similar manner, holding in cold solution considerable quantities of iron, which are released on digestion with dissolved oxygen under conditions like those in hot-water pipes.

It may be that the development of some method of speedily ripening coloring matter for immediate removal is prerequisite to the theoretically easy prevention of corrosion proposed by Whitney. In cases where this ripening has already been accomplished, as in the instance cited by Mr. Ledoux (8), the prevention of red water appears simple, though accomplished at a considerable increase in hardness. In other instances, it may appear that aëration for partial removal of carbon dioxide will sufficiently prepare a water for color removal and the inhibition of corrosive action. There are doubtless others which will be better met with another treatment.

The removal of color from a relatively hard water, containing much magnesium, is well accomplished to the extent that magnesium carbonate is precipitated. It is at an early stage in the progressive addition of lime water that the greatest color removal occurs. Addition of magnesium chloride or sulphate and precipitation from soft colored waters of large volumes of magnesium hydroxide is not productive of the same degree of color reduction. The success of the magnesite used by the Candy Filter Company in English practice suggests the propriety of appeal to this reagent as better adapted for the removal of color from very soft waters. The question of the occurrence of magnesium carbonate in chalk so commonly used in treatment of soft English waters may be fairly raised, as a possible explanation of the success of chalk treatment and the general failure of the use of lime alluded to by Mr. Thresh in his discussion of Mr. Whipple's latest paper (12).

SUMMARY.

The purpose of this paper is to emphasize the intimate relation between certain forms of organic matter, and the varied behavior of coloring matters in natural waters, which have served to protect or to increase the corrosion of metals in water.

Corrosion in many cases is associated with highly colored waters.

Some apparently conflicting evidence is cited as to the effect of lime treatment on colored waters.

Organic matter may be either protective or corrosive.

A discrimination is made in the behavior of organic (coloring) matter with coagulants, and a suggestion offered as to the possible cause of some cases of red water in hot-water systems, from the breaking down of complex alcoholates with metal ions.

The question is raised as to the development of color removal methods as prerequisite to a full understanding of some local occurrences.

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PROGRESS REPORT OF THE COMMITTEE ON COLLECTION AND DISPOSAL OF SEWAGE.

Read before the Sanitary Engineering Section, American Public Health Association, Colorado Springs, September, 1913.

INTRODUCTION.

It was the intention of the Council, as set forth in the letter of the secretary notifying members of their appointment, that this committee should review the field of sewage collection and disposal, and select certain topics which might profitably be made the subject of discussion at this meeting or delegated to special committees for future investigation.

As an inducement to such discussion, it is proposed to briefly outline those phases of sewage collection and disposal which are most closely related to sanitation, touching the construction side of the work only incidentally.

The statements made should be considered in a broad, general way and not as applying to every individual case, for frequently local conditions make special requirements necessary.

THE COLLECTION OF SEWAGE.

Sewage collection in the present day sense may be taken to mean the removal of domestic and manufacturing wastes by water carriage in a system of underground conduits, which, through the house connection, laterals, main and intercepting sewers, serves to convey these wastes from the dwelling to the point of discharge or treatment.

Towns not having a sewer system usually depend upon the pail system, privy vaults or cesspools for the collection of the excreta of the citizens, The danger of the contamination of water-wells and of the spread of fly-borne diseases from these methods renders them a menace to the public health.

Sewerage systems are the outcome of modern water supplies. So long as people live scattered over the country, no difficulty is found in disposing of the offensive refuse of living. Under such conditions the amount of water consumed is relatively small, and the simple natural agencies of absorption and diffusion serve to dispose of it when made dirty by use. With concentration of population, however, the pollution of the individual sources necessitates a public supply. The greater convenience of the faucet over the pump soon results in bringing into the populated area a greatly increased amount of water, for the discharge of which artificial provision must sooner or later be made. If the soil is impervious and of low capacity for absorption, conditions soon develop which suggest the use of pipes to carry the sewage away. Generally some drains have already been built to discharge surface water; with these the premises are connected, and the offensive wastes are emptied into the nearest water-course. If this water-course is too small to properly dilute the sewage, a local nuisance follows; this, and the fact that other citizens have not been so fortunate as to find an outlet for their liquid refuse brings to a focus the problem of constructing a sewerage system. At the present day, this generally occurs before conditions have become so bad as to greatly affect the health of the community.

Separate and Combined Systems. A modern system of sewers has two functions: first, to remove rain-water from the streets, yards and roofs of the town; second, to remove the liquid wastes of the community and convey them either to water-courses or to treatment works.

In order to accomplish these dual functions two types of construction have been adopted, known as "combined system" and "separate system."

The combined system originated in the drains which were built in early times with the intention of carrying rain-water exclusively and lowering the level of the ground-water. Into these drains the sewage of the town was admitted. In this system, therefore, the sewage and rain-water are carried in the same conduit.

In the separate system the sewage and rain-water are carried in separate channels. The rain-water is discharged directly into nearby water-courses and the sewage is carried to a point where its discharge will be less objectionable or to a treatment works.

Intercepting Sewers: Where a city is already sewered upon the combined system and where the discharge of the sewage into a natural water-course either creates a nuisance or is prejudicial to public health, it becomes necessary to treat the sewage before its discharge. In such cases an intercepting sewer may be built parallel to the water-course with suitable connections to the collecting sewers, so that the dry weather flow of sewage and first flush of the rain-storm flow into the intercepting sewer. During times of storm the excess rain-water and the very much diluted sewage overflow into the water-course; for the expense of treating all rain-water would be prohibitive. In England the requirements of the authorities stipulate that the storm-water overflow shall only come into operation when the flow of sewage is increased sixfold and the sewage works must be constructed to deal with six times the normal dry-weather flow. Since the consumption of water in England is approximately forty gallons per capita per day, and the consumption in America sometimes exceeds 200 gallons per capita per day, it is evident that the dry-weather flow of sewage in America is nearly five times as dilute as that of English cities. Arrangements, therefore, for intercepting the dry-weather flow of sewage and the first flush of a rainfall compare well with English practice.

Velocity of Flow. Obviously, since the object of the collecting system is the rapid and complete removal of the decomposing wastes by water carriage, the provision of such hydraulic conditions as will best effect this result is an important consideration in the design. The gradients of all sewers should be such as to develop self-cleansing velocities, which the best practice shows should not be less than two feet per second in the separate system and two and one-half feet per second in the combined system. Steep gradients, however, necessitate deeper trenches, and here, as in most engineering problems, a solution must frequently be found between the ideal and that economically possible. As a result, flatter gradients than will give the above-named velocities are often used, and while more frequent flushing is made necessary, no trouble has resulted, provided the sewers are constructed with due care to obtaining a smooth interior surface. Where the expense of obtaining steeper gradients is material, an actual velocity of one foot per second in a well constructed sewer, carrying domestic sewage, will, with a reasonable amount of flushing, keep the sewer clean. Trade wastes of certain character, however, require higher velocities to prevent deposits.

Ventilation. Ventilation of the system becomes a problem where the sewers are not kept clean by the normal flow, or by flushing. Unless deposits form and decomposition results, there is little odor from sewage, and the danger of disease transmission by sewer gas is negligible. The omission of the house trap and the use of the main riser through the house to a point above the roof is the most effective means of inducing circulation of the air in the sewers, and, with proper inspection of the plumbing system, involves no danger, but the best solution of the problem of ventilation is, as already stated, to maintain clean sewers.

Trade Wastes. Sewer systems are primarily designed and built to carry domestic sewage and rain-water. The introduction of trade wastes having certain characteristics is, therefore, liable to injure the sewers in the following ways:

(a) Heavy mineral solids, such as lime from glue works, dust from marble yards, etc., can form deposits in the sewers which retard the flow and reduce the carrying capacity.

(b) Gelatinous materials, hair from tanneries, grease from wool works, and similar substances, by adhering to the perimeter, increase the roughness of the interior surface and so reduce the carrying capacity.

(c) Acid wastes injure the cement joints between brick work or pipes, or attack concrete, causing leakage and destruction of the fabric of the sewer.

(d) Liquids of high temperature may soften and injure the bituminous joints in pipe sewers used to prevent the infiltration of ground-water.

(e) The discharge of live steam, volatile liquids or inflammable gases;

or the sudden emptying of vats of hot water, cause a serious menace to men working in the sewers.

Trade wastes having the above properties should be strictly excluded from the sewer system, unless submitted to sufficient treatment to remove the objectionable characteristics—as, for instance, the wash-water from garages contains gasoline, which can be easily removed by passage through an intercepting tank, as required in London.

In regard to the admission of other trade wastes it may be said that it is cheaper to dispose of manufacturing wastes in combination with the sewage than separately, and sometimes purification is only made possible by admixture with the sewage. Generally, it is good civic policy to aid manufacturing interests by providing an outlet for the liquid wastes, but obviously, since there is no greater obligation on the part of the community to take care of liquid than of solid manufacturing refuse, the power should be given those in authority to levy special assessments, based on some logical expression of the increased cost of maintaining the sewerage systems caused by the entrance of these wastes. Further, it is evident that in many cases preliminary treatment of the manufacturing wastes must be required, and none should be admitted which will injure the sewer, increase the cost of maintenance beyond that involved in independent disposal, or prejudicially affect the treatment of sewage.

Ground-Water. The reduction of the leakage of ground-water into sewers, where treatment of the sewage is required, is a feature which is of sanitary interest. Many disposal plants are overworked, and overflows into the neighboring water-courses made necessary because of leakage in the seasons when the ground-water is high. It is believed that the expenditure of the money necessary to secure tight joints is well justified and should be given careful consideration.

In connection with the reduction of leakage, it is good practice to lay underdrains beneath the sewers, lowering the water-table, and, by improvement of subsoil conditions, subserve the interest of public health.

Finance. While not strictly within the scope of this discussion, a few words in regard to the financing of a sewer system may not be out of place. Very frequently the sanitary necessity for improved sewerage is confined to a limited section of the town or city. Those living outside of this more congested section are satisfied with their present method of individual disposal, and oppose the undertaking of a municipal system. The result is that very often the work is thus delayed because of a feeling that the entire community will have to pay for something from which only a part will obtain commensurate benefit. The answer lies in a proper method of assessment, which will require contributions in proportion to the benefits conferred. Thus, if a small part of the total expense is met by a general levy on all property to express the sanitary betterment to the entire community, a larger part is raised by assessment on property abutting on streets where sewers are built, whether those sewers are used or not, and, a still larger part is obtained by rentals for actual use, the relative benefits will be fairly indicated, and the opposition to the improvement by those not particularly in need of sewers may be thus removed.

Comprehensive Planning. Good design and adequate supervision of the work in construction are necessary to success. Because laying a pipe in trench appears easy, too often insufficient care is taken in construction. The essential requirements for a clean, sanitary sewer, are true gradients, straight lines, and a smooth interior which will facilitate the water carriage of the solid matter; and to fulfil these requirements careful supervision is necessary. In many cities sewers have been built in piecemeal fashion, not following any general plan, and with small regard for future conditions. The result is subsequent difficulty in the design of interceptors when treatment becomes necessary. It is good civic policy to have a comprehensive design prepared which can be followed, as the sewers are from time to time constructed. Our towns and cities are rapidly growing, so that the population contributing sewage may overtax streams now adequate to care for it. It is, therefore, wise to provide for treatment works which can be added when needed. In other words, if a complete sewerage system is designed in the beginning each increment can be added and fully utilize the existing structures. It should also be borne in mind that the addition of sewage of a town from a number of sewer outlets is less liable to overtax the diluting power of that stream than when the intercepting sewer has collected all the town's sewage and discharges it at one point.

THE DISPOSAL OF SEWAGE.

The disposal of sewage is complicated by many perplexing phases. Twenty years ago scarcely anything was being done in this country in the line of treating sewage, not so much because there were no nuisances caused by sewage pollution of running waters, but because ways of obviating them were undeveloped. Since that time various methods have been satisfactorily demonstrated, so that today both domestic sewage and trade wastes may be purified to any desired degree, if financial means be provided. The main question is, to what degree shall sewage be treated to meet in a satisfactory manner a wide range of conditions.

Sand Filters Set the Standard. The classic investigations carried on by the Massachusetts Board of Health during the past twenty-five years and the practical experience derived from the treatment of sewage in New England towns (such treatment being confined for the most part to filtration through intermittent natural sand filters with resulting high degree of purification), doubtless tended in the beginning to instill into the minds of sanitarians the belief that it was desirable and perhaps necessary to purify sewage very thoroughly in all cases where treatment was required before discharging it into running waters. Thus the early standards of purification set by New England practice were very high.

The Coarse Grain Filters. West of and beyond the glacial region, broad areas of sandy soil were seldom available. The cost of procuring sand and fine gravel and transporting it from a distance was prohibitive. Intermittent sand filters were thus eliminated from choice, excepting on small installations. Consequently, coarse-grained, less efficient filters have gradually come into use. Supplemented by chemical disinfection a nonputrescent, nearly sterile effluent can be obtained from these, even though it may not always be clear.

Need for Economy. Viewing the problem broadly, it is a fact that to purify sewage to a degree which will render it innocuous to health will entail an expense which is not commensurate with the benefits to be derived therefrom. The tax rate in American cities is rapidly increasing, owing to rapid growth and the demands of modern civilization. Municipal funds may be used to greater advantage and benefit in other ways than attempting to purify sewage to the complete elimination of its potentially dangerous qualities.

Surface Waters Polluted. Surface waters flowing through territory inhabited by man is almost certain to become polluted by agricultural drainage, street washings, and other refuse of man's activity, including sewage. Even in the case of towns provided with a complete sewerage system and the most thorough means of treatment of its sewage, there are storm-water overflows which discharge at times street waste and even sewage in a crude state into the water-courses; the majority of sewage treatment works have emergency overflows, or by-passes, which may allow partially treated sewage to enter the stream in the event of the disarrangement of any part of the system.

These are only a few of the reasons why surface waters require purification before being delivered to the consumer, whether or not there is a complete system of sewage treatment caring for all towns along the stream.

Recognizing the basic fact that surface waters are bound to be polluted, and recognizing the futility of attempting in general to render the sewage innocuous to health (that is, to destroy all the pathogenic germs it may at any time contain), it then becomes necessary to determine to what degree sewage must be treated.

THE DEGREE OF TREATMENT REQUIRED,

To determine the degree of treatment required for sewage in any particular case requires consideration of the whole water-shed of the stream. On a large drainage area there are usually a number of communities which have a unity of interests. It is not always possible to prescribe the exact degree of cleanliness which should be maintained in the water-course, because it will differ with each stream and at different points along the same stream. As, for example, in the case of two communities, one near the head-waters of the stream and having several communities below it, the other near the mouth of the stream, which may be a tidal estuary.

The degree of treatment required in each case will depend on the amount of pollution permissible in the light of the use to be made of the water of the stream below the point of discharge of the effluent.

These are cases where it is, doubtless, expedient and wise to purify sewage to a greater degree than in others, as, for instance, where numerous cities and towns are located within a relatively close distance of one another and each taking its water supply from and discharging its sewage into the same river.

Other things being equal, it is always easier to satisfactorily purify and render safe a polluted water the less polluted that water is.

Logical reasoning forces the conclusion that all waterways are necessarily polluted, and where such waters are used as a source of water supply that they should be purified before consumption. Basically, the broad problem may be stated as follows:

1. Sewage, or effluent from treatment works, must continue to be discharged in increasing quantities into running waterways and tidal estuaries.

2. The establishment and maintenance of conditions offensive to the æsthetic senses through discharge of sewage must be guarded against.

3. Where sewage is treated so that upon its discharge into the rivers and tidal estuaries no offensive conditions are set up as regards objectionable appearance and odors, and no undue load is placed upon the water filters within the influence of the sewage discharged, and where a suitable margin of safety is allowed, the problem of sewage disposal, broadly speaking, has been solved.

With few exceptions, all sewage should receive some form of treatment in order that offenses shall not result. These refer, first, to overtaxing the digesting or oxidizing power of the diluting stream; second, to the formation of sludge deposits on the bed and banks of the stream, these deposits putrefying later, and setting up and maintaining offensive conditions; and, third, the presence of floating material and oily sleek.

Omitting from the problem of sewage disposal the influence on water supplies, it may be said that, with sufficient dilution and adequate velocities, screening to remove floating matter is the minimum degree of treatment required in any case. Usually, however, it is necessary to go further and remove the heavy suspended matter leaving only that which is light enough not to deposit in the stream and if the flow of the stream is sufficient to dilute the clarified sewage and prevent offense, the problem is solved. It is not permissible to allow such highly objectionable conditions as are found in the Blackstone River in Massachusetts, the Passaic River in New Jersey, and in Bubbly Creek, a tributary of the Chicago River in Illinois. The Mississippi River receives the sewage of some 10,000,000 people, yet the dilution is sufficiently great to preclude for many years the establishment and maintenance of offensive conditions anywhere along its route. Local nuisances at outfalls might, however, occur. The reasonable solution would appear to be a study of each problem in the light of minimum stream flows and volume of sewage, and under summer conditions. The character and extent of treatment of the sewage should then be adequate to meet these extreme conditions. There is a sanitary aspect of the problem, as well as an æsthetic aspect. A river, otherwise not offensive, can be so charged with sewage as to preclude the use of its waters as a desirable source of domestic supply. There must, in line with good public policy, be a limit, from the health standpoint, to the pollution of drinking-water with sewage.

In the filtration of such polluted river water, under most trying conditions, experience has demonstrated the desirability of adding hypochlorite of lime or other sterilizing agents. The temporary admission of raw water to the town during shut-downs of the water filtration plant, through accident or other cause, has in not a few instances resulted in epidemics of water-borne diseases.

Even though filtration be used the source of water supplies should not be so polluted but that in cases of emergency, the raw water cannot be sterilized and delivered safely into the mains. This points to the proposition that to preserve the public health it is not only necessary to purify the water supply but also to protect its source. It is feasible, for short periods, to render river water that is slightly contaminated, pure and wholesome for domestic use through the application of a chemical germicide; but such mode is not sufficient where the water is very much polluted with sewage. Existing statutory laws of the several states differ. Constitutional provisions necessarily control to some extent. Uniformity of laws will not be approached until there is some Federal authority, like a national board of health, whose duty, among other things, it shall be to exercise proper control over interstate stream pollution.

Fish Industry. The fish industry is not usually affected in moderately polluted waters, unless certain trade wastes are present to taint the flesh with tastes, or poison the fish. The amount of pollution must be carefully studied, as well as the minimum oxygen content, to determine whether the environment it favorable. Fish are usually eaten after thorough cooking.

Shell-Fish. With shell-fish, which in numerous instances are consumed uncooked, it is different; inasmuch, as it is not feasible to render sewage innocuous by itself, dangerous bacterial contamination of shell-fish grown in grossly polluted waters, cannot be prevented. And generally the value of shell-fish industries is of far less importance than the comfort and convenience of cities and towns which are forced by circumstances beyond their control to use running water for the disposal of their sewage.

The conservation of the shell-fish industry in polluted waters may be aided by the sterilization of sewage before discharge therein, but shell-fish should not be harvested or marketed from water exposed to sewage pollution except in such localities where properly instituted technical authorities shall determine the origin of pollution to be sufficiently remote from the shell-fish beds to avoid contamination.

Trade Wastes. The trade waste phase of sewage disposal is perhaps more difficult of satisfactory solution than the main sewage problem, for the following reasons:

Trade wastes come from industrial development which constitutes the financial backbone of the country's welfare.

If the industries are compelled by certain local conditions to purify their wastes before discharge to a greater degree and at a higher cost than their competitors, more favorably situated, where competition is sharp, their business profits may be seriously affected and even result in their financial ruin.

Generally speaking, the presence of trade waste, in the proportion usually found in normal city sewage, does not affect the efficiency of sewage treatment.

Where, however, large industries add certain wastes to a sewerage system, the treatment works of which were designed for purely domestic sewage, it is possible that the works may be totally unable to successfully treat the mixture.

Industrial wastes are frequently discharged from tanks in large volumes during a short time. This places an unnecessary burden upon the treatment works and can be prevented by the discharge of such tanks at a slow rate.

There are trade wastes which, under certain local conditions, affect the efficiency of water purification works, adding to the expense of their operation and even seriously affecting their hygienic efficiency. When such injurious conditions are caused by trade wastes, two solutions appear possible:

1. For the producer or manufacturer to so treat the waste before its discharge that the obnoxious conditions are removed.
2. For the producer or manufacturer to reimburse the affected parties for the additional cost of treatment caused by the trade waste.

Night-Soil. In the water carriage collection of sewage the water-courses have received and must always continue to care for the liquid portion of the sewage. When, however, a town is not so equipped and the excreta of the citizens is collected by pails, privy vaults or cesspools, the problem of disposal is different. The material so collected is called night-soil and its sanitary disposal has been much neglected in the past.

One of the common modes of disposal is the storage of the night-soil in poudrette pits and its later use in liquid form as fertilizer for garden vegetables. While pathogenic bacteria are not thought to increase under these conditions it is known that they maintain their viability for considerable periods of time, and such a use for night-soil cannot be too strongly condemned.

The sewer system is rapidly replacing this unsanitary method of collecting excreta and the quantity of night-soil to be disposed of is steadily decreasing. Permanent and expensive methods, such as incineration or drying by heat are, therefore, rarely practised except in field service or construction camps. Where all conditions are favorable a solution can be found in establishing a station in some isolated section where the night-soil can be brought, flushed by water through screens to restrain rubbish, a disinfectant added, and the diluted liquid admitted to a trunk sewer where, mingling with the large volume of sewage, it will either reach a water-course or treatment works.

THE TREATMENT OF SEWAGE.

The general sanitary principles governing the disposal of sewage upon hygienic and æsthetic bases having been determined upon, the treatment of sewage in order to maintain these conditions in the water-courses is largely an engineering problem, and, therefore, the basic principles only are given herein.

Nature has provided for the conversion of all dead waste into food for living organisms through the biological forces of the soil and water-courses. It is only when man overtaxes these natural resources that ill results follow. In order to avoid this overtaxing, man has been forced to construct artificial works to assist nature, in the design of which it is the duty of the engineer to utilize every natural resource to the fullest extent in the interest of economy, so long as it is compatible with the protection of public health.

Discharge of Crude Sewage. There are cities situated upon large bodies of water not used for water supplies, and having sufficiently high velocities of flow to prevent deposits of sludge; where crude sewage is discharged after coarse screening in a way to be thoroughly diffused with water and does not violate the hygienic or æsthetic standards proposed above.

Removal of Suspended Matter. The minimum amount of treatment usually consists in the removal of the coarser suspended matter and the heavy mineral detritus. The use of coarse screens will prevent the offensive appearance of a water-course caused by floating solids of sewage origin, and the silting up of the point of discharge is prevented by the retention of the detritus in grit chambers.

Where the diluting power of the stream is not sufficient, or where velocities of flow are such that deposits would form, which, by decomposition and putrefaction deplete the water of its natural oxydizing powers, more suspended matter must be removed from the sewage. This can be accomplished by the use of either fine screens or sedimentation tanks. If the settling solids are removed by tanks the deposits of sludge in the water course are prevented. The biological forces of the water-course, therefore, are only required to care for the finely divided and soluble organic matter of the sewage effluent.

While dilution may care for the liquid effluent after sedimentation, the sludge removed from the fine screens, or from the tanks, must be handled in a sanitary manner. Screening stations usually are accessible to power or garbage disposal plants where the screenings can be burnt.

In Germany, and in this country, it has been shown that the separation of the settling sewage and the decomposing sludge in two-story tanks will keep the sewage, during its retention, nearly as fresh as received. If the sewage be stale and odorous, however, this type of tank has no deodorizing effect, as its only function is the removal of suspended matter and decomposition of sludge.

The sludge withdrawn thereform is practically odorless, drying quickly, and is suitable for filling low land or lightening heavy soil for agricultural purposes.

Removal of the Putrescence of Sewage. Where sewage must pass into water-courses of limited volume, or where for sanitary reasons, it is necessary to still further treat the sewage, the removal of the settling suspended matter is supplemented by biological treatment in prepared beds.

The sewage should preferably be freed of its settleable solids before such treatment in order to secure higher rates of operation.

The intermittent filtration of sewage on sand beds accomplishes complete treatment; inasmuch as the suspended matter in the crude sewage applied is collected at the surface, the organic matter is almost completely oxidized in the pores of the filters and the bacteria largely removed by the smutzdecke. The rate of filtration is necessarily low.

In bacteria beds or the rapid coarse grain filters, however, the action is much less complete, since it only converts the putrescible material into fairly stable forms, so that when such an effluent is discharged into the water-course the purification begun in the artificial works should continue.

DESIGN AND OPERATION OF SEWERAGE WORKS.

It has already been stated that expert services are required for the efficient design of a sewer system and treatment works. Equal necessity exists for the skilled supervision of the operation of these works, the extent to which such supervision should prevail depending upon the type or class of works.

It is possible to determine along general lines what the proper attention for each class of plant should embrace.

It follows that skilled supervision of the operation of sewage works must be compulsory.

State or Federal control is indispensable, although supplementary in character.

The foundation for efficient and economical operation of sewage treatment works generally must be based upon careful statistics of operation.

Records of daily operation of works should be uniform for the same class or type of plant and to enforce such records requires the exercise of not only local but also of state and national police power.

The management of works is so well expressed by Mr. John D. Watson (in charge of the works at Birmingham, England), in his paper read at the Fifteenth International Congress on Hygiene and Demography in Washington, that it is given herewith:

"One word with regard to management. However well a plant may be designed, if it is not well and skilfully managed it will become a nuisance and bring discredit to the engineer who designed it. The disposal of the liquid filth of a great community has an enormous potentiality for evil, and if a town authority believes it necessary to avert this by expending large sums of money on constructural work, it is their bounden duty to see that the plant is placed in the most competent hands. Local authorities are by no means sufficiently alive to this aspect of the question, with the result that too many works are left to the management of untrained men. Hitherto, anybody has been deemed good enough to look after a sewage work, but the day has now come when the manager should be a highly trained technical expert, if a local authority hope to get full value out of the sensitive entity which we call a bacteria bed."

Laboratory Control. The operation of a sewage treatment works is usually controlled by laboratory observations.

The methods generally used are largely adapted from the sanitary examination of water, and in many ways this work could be simplified.

What the operating engineer needs to know is whether each part of the works is being operated at its maximum efficiency and whether the final effluent is suitable for discharge into the stream to maintain the standard set for that stream. For purposes of comparison with other cities more complete analyses are often desired of the crude sewage and of effluents. For instance, in the operation of a grit chamber the only important observation is the percentage of the dry residue which is organic, for if it is too high the velocity of flow through the grit chamber should be increased.

In the operation of a percolating filter it is most important to know whether the filter is delivering a stable effluent, and the storage and unloading of the suspended matter.

The most important facts required on sewage or effluent are the amount of settling material contained, the avidity for oxygen, and possibly the prevalence of pathogenic organisms.

The methylene blue test for stability marked a considerable advance, but even this has its limitations owing to the need of more extended data. Perhaps if natural conditions could be more nearly imitated the results would be more valuable. Small sample bottles, incubated air tight, afford quite different conditions from those existing in a normal stream with its constant absorption of oxygen from the air and the addition of oxygen liberated from green plants in the water.

Tests which show the results of the biological activity in the exhaustion of available oxygen in the sample tell more clearly the fitness for an effluent to be discharged than the quantitative chemical analyses of the sample.

Recommendations of topics for future committee investigation and suggestions of subjects for discussion at this meeting, appended.

George S. Webster, *Chairman*,
Frank A. Barbour,
George A. Johnson,
F. Herbert Snow,
J. L. Ludlow,
Landgon Pearse,

Recommendations.

The Council, in appointing this committee, asked that it should make recommendations for special fields for committee work.

In accordance therewith, it is recommended that a joint committee of the vital statistics Section and the Sanitary Engineering Section, be appointed to make investigations and report upon the effect upon the death-rate attributable to the introduction of a system of sewers.

Also the relative efficiency in the protection of the public health by the filtration of water and by the treatment of sewage as measured by the death-rate from water-borne diseases.

That a joint committee of the Laboratory Section and the Sanitary Engineering Section be appointed to make investigations and report upon standard methods for the operation and supervision of sewage disposal works.

SUGGESTIONS FOR DISCUSSION.

Your committee suggests for discussion the following subjects, all of which are dealt with more or less in detail in the body of this report:

1. The importance of constructing sewers with smooth interior surfaces and of sufficient gradients to maintain self-cleansing velocities.
2. The advisability of the omission of the house trap on sewer connections.
3. The regulation of trade wastes which may be injurious to the sewer system and add to the cost of operating sewage treatment works.
4. The importance of so constructing sewers and house connections with tight joints to exclude ground-water infiltration.
5. The need for experts in planning and operating sewer systems and treatment works.
6. Simplified or improved laboratory methods for the control of sewage treatment works.
7. The economic balance between the water purification plant and the sewage treatment works.
8. The minimum oxygen content allowable in a stream or body of water, (1) to avoid nuisance and (2) to support fish life.

DISCUSSION.

CHARLES V. CHAPIN, *Superintendent of Health, Providence, R. I.*

It seems to me that in the matter of oyster pollution every case must be studied by itself and decided on its own merits. I am inclined to think that the danger from this source has been considerably exaggerated but I am heartily in favor of official supervision of all oyster beds and the forbidding of shipments from beds dangerously polluted if a reasonable standard can be determined upon. Many oysters from polluted waters have in past years been consumed in Providence but I have been unable to determine after a careful consideration of the data that this has had any influence on the incidence of typhoid fever in this city. I believe that sewage can be disinfected so as to destroy the pathogenic bacteria which are to be feared in this connection and I think that all sewage discharged over oyster beds ought to be so disinfected. This is what is being done with the Providence sewage amounting to over 20,000,000 gallons a day.

I certainly do not think that fresh night soil ought to be used on crops which are likely to be eaten raw. If the night soil is dried and bagged it is very possible that by the time it reaches the soil all pathogens will be dead. I do not think this method of disposal should be condemned without further investigation. Such investigation is very desirable.

H. C. MCRAE, *Division Engineer, Baltimore Sewerage Commission.*

A considerable amount of thought, some of which has been expressed in print, has been given recently to the subject of analytical procedure in connection with the operation of sewage treatment plants. It is encouraging that some effort is being made to break away from the effect of tradition along these lines. It took a long time for sewage analysts to leave behind the determination of albuminoid ammonia which had proved so valuable in the examination of potable waters, and it is seemingly taking a long time to leave behind certain other tests bequeathed by water experts. The investigators at Columbus spent a great amount of time and energy in collecting engineering data which seemed to them important at the time. Investigators later at Boston, Baltimore, Philadelphia, Gloversville, and other places, followed in the groove, probably, for the most part, because they were afraid to get out of it. Tables showing analyses of nitrogen in all forms, oxygen consumed, and suspended matter, in all stages of treatment, look well in reports, but, after all, are they worth the effort necessary when an attempt is made to use them for guidance in operating a plant? It is, no doubt, wise to continue the collection of such data as far as raw sewage is concerned for the purpose of comparison between different localities, but, as far as operation is concerned, the time seems ripe to discard them for the most part and devote the time saved to studies of stability, oxygen conditions at various stages, and particularly the condition of streams and lakes into which effluents are discharged and the effect of effluents on such water bodies. In the last analysis the effect on a stream or lake is the important thing. The study of these is, therefore, as important, if not more so, than the study of the effluents themselves. If laboratory practice is to keep pace with progress in other phases of sewage treatment, this fact must be recognized and acted on quickly.

The need for technically trained men to operate sewage treatment plants is so positive that to discuss it seems almost like discussing the axiom that a straight line is the shortest distance between two points, but, unfortunately, history has shown that authorities responsible for many plants, particularly those of moderate size, have often been content to let the plants virtually run themselves; or, in other words, have entrusted their operation to ignorant and even careless attendants. Such procedure has resulted in nullifying much effort and thought on the part of sanitarians by bringing the science of sewage treatment in bad repute with the laity who naturally are influenced by results rather than by theoretical considerations in the minds of designers. It is of great importance, therefore, that all who are interested in this subject should not lose any opportunities to further the chances of successful operation of treatment plants by bringing about a condition whereby competent, trained men will be placed in charge.

A sewage treatment plant to an operating engineer is much like a sick man to a physician. The appearance of the sewage, filter beds and effluent to the eye, the odors characteristic of certain conditions, the organic life present at various stages and the facts shown by analytical procedure are symptoms indicative of conditions just as the appearance of a man's features, the feel of his pulse, his temperature, the analysis of his urine or a microscopical examination of his blood are signs by which the physician can form an estimate of his condition and from which he can reason logically and decide intelligently as to ways and means to alleviate it.

A man with the proper training to bring forth the ability and desire to learn the symptoms and to prescribe properly has an even chance of making a plant accomplish the intent of the designer, while one who simply goes through the motion of opening and shutting valves is almost sure to make a mess of things, unless favored by an unusually kind Providence.

As previously suggested, it is usually the case of small plants that the hesitancy to spend a proper amount of money in order to obtain competent operators is most pronounced. To better conditions in this regard, it would seem that some sort of central control body should have jurisdiction over such plants with powers to enforce the employment of proper men, placing, if necessary, a number of plants under the control of one man. Such an arrangement would make it possible for large enough salaries to be paid to attract the proper quality of men, and only when this result is accomplished will the intent and painstaking work of designers cease to be nullified by ignorance and neglect.

Marshall R. Pugh, *Philadelphia, Pa.*

The eminent degree of common sense displayed in this report, and the frank avowal of the necessity at times of falling short of theoretical perfection in order to attain practicable results, are calculated to have a great influence for good.

The statements about velocity of flow are noteworthy. Many communities have been put to much additional expense both for added costs of construction and maintenance costs for operating pumps, simply because a 2-foot per second velocity of flow was regarded by the engineer as not merely desirable, but as absolutely essential. To cite but one instance out of many: The original cost of a proposed system was reduced 40 per cent. and maintenance nearly 99 per cent., and a gravity flow obtained, simply by substituting a flow velocity of 1.1 feet per second for that of 2 feet per second. Had not this been done, the community could not have met the added initial expense, and the cost of operating a pumping plant. The result of years of successful operation has justified the choice. A velocity of flow as low as 0.7 feet per second in a 10-inch terra-cotta sewer has worked well for a decade, and saved another municipality the cost of pumping for a low-lying district during all that period. The flushing cost has been less than $50 during the same length of time.

Under "Ventilation" the report will greatly strengthen the position of those who, like the writer, have frequently been in a losing struggle in opposing house traps. One borough was induced in 1904 to pass an ordinance which, after providing for the extension of the soil pipe, "4 inches in diameter, which must extend full size at least one foot above the roof," further said, "There shall be no traps or catch basins placed in the line between the house and the sewer in the street." Doubtless others had similar regulations before this, as numbers have had more recently; but the vast majority insisted on traps.

The elimination of ground water might have been even more forcibly touched on, without over statement of its importance. In a collecting system composed of terra-cotta pipes, the sewage from which must be treated, tight joints are essential, and if the sewer is in wet ground, tightness may spell the difference between the success and failure of the sytsem. Under such conditions cement joints are not to be thought of, but some bituminous material should be substituted.

Several trade products, in which the joints are poured like the lead joints in water pipe, are excellent if properly applied and if the ditch can be kept free from water while the pouring is done. The claims made for successful pouring when either entirely or partially under water have never been proved to the writer's satisfaction. When the ditch cannot be kept *entirely* free from water, a joint of Carolina tar, kneaded into a stiff dough with cement, forms probably the tightest and most satisfactory joint yet known. The objection to its use lies in the fact that as it is forced into the pipe by hand, no amount of inspection can insure good workmanship. The only salvation lies in employing a careful and conscientious caulker, in which case no difficulty will ensue. The tar contains from 5 per cent. to 30 per cent. of moisture, which the cement abstracts, thus setting and hardening. The chief function of the cement, however, lies in the fact that it is the most finely ground and uniform aggregate that is commercially available for kneading into the tar. Joints of this material thirty years old have been exposed by the writer recently, and found to be as tight and sound as when first laid. Settlement of the sewer does not impair bituminous joints, which are sufficiently yielding to permit quite a large deflection and still remain water tight.

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

The quarterly meeting of the Massachusetts Association of Boards of Health was held in New Bedford on Thursday, October 9, by invitation of the New Bedford Board of Health. The morning was devoted to inspection in New Bedford. The members were escorted in automobiles to Padanaram where a clambake was served.

President Samuel H. Durgin presided. On motion the reading of the minutes of the previous meeting was dispensed with. Prof. William T. Sedgwick presented an interim report of the Committee on Revision of Constitutions. Copies of the proposed constitution were circulated. Upon the recommendation of the Executive Committee the following persons were elected to membership in the association:

Mr. Abner Morse, Canton Board of Health, Dr. D. S. Luce, Canton Board of Health, Dr. S. H. Stone, Secretary of the Association for the Relief and Control of Tuberculosis, Boston, Mr. James C. Clark, Wareham Board of Health, Mr. R. P. Borden, Fall River. Mayor C. S. Ashley of New Bedford delivered an address of welcome to the association.

The following paper was then read: "The New Intercepting Sewer System of New Bedford," by William F. Williams, C. E., Chief Engineer, Massachusetts State Harbor and Land Commission.

Prof. William T. Sedgwick addressed the association on the School for health officers recently established by Harvard University and the Institute of Technology jointly.

On motion duly seconded the thanks of the association were extended unanimously to the New Bedford Board of Health and to the gentlemen who had so kindly loaned their automobiles.

There being no further business, the meeting then adjourned.

BOOK REVIEWS.

Elements of Water Bacteriology. *By Samuel Cate Prescott and Charles-Edward Amory Winslow. Third Edition. Rewritten. 306 pp. with index and numerous tables. New York, John Wiley & Sons, Inc. 1913. $1.75.*

The contents of this excellent text-book are as follows: Chapter I, The Bacteria in Natural Waters. Chapter II, The Quantitative Bacteriological Examination of Water. Chapter III, The Interpretation of the Quantitative Bacteriological Examination. Chapter IV, Determination of the Number of Organisms Developing at the Body Temperature. Chapter V, The Isolation of Specific Pathogenes from Water. Chapter VI, The Colon Group of Bacilli and Methods for Their Isolation. Chapter VII, Significance of the Presence of the Colon Group in Water. Chapter VIII, Varieties of Colon Bacilli and Their Special Significance. Chapter IX, Other Intestinal Bacteria. Chapter X, The Significance and Applicability of the Bacteriological Examination. Chapter XI, Bacteriology of Sewage and Sewage Effluents. Chapter XII, Bacteriological examination of Shell-fish. Appendix.

It is five years since the second edition appeared. Since that time there has been important progress along many lines of sanitary bacteriology. Besides the new edition of the reports of the Committee on Standard Methods of the Laboratory Section of the American Public Health Association has been published. Not only has the book been revised in accordance with the present state of the science, but certain of the chapters have been rewritten.

Regarding the advisability of omitting the 20-degree count, the authors place themselves on record as opposing the practice, and, as in earlier editions, make their position plain.

Chapter V has been greatly expanded, and the reviewer finds that there are included all the reliable tests for special organisms. Naturally in a work on water bacteriology special attention has been paid to the isolation of B. coli and allied forms. The subject is well and judicially handled and the conclusions are those accepted by bacteriologists in general. It does seem, however, that the authors' statement that all bacteria which will ferment lactose-bile are objectionable may have to be modified as the knowledge of organisms, and especially ground water organisms, becomes wider.

Chapter XII on shell-fish is new with this edition and discusses in a very practical way the bacteriological methods for the sanitary grading of shell-fish and contains an interesting discussion of the relation between shell-fish and disease.

As a text-book, the work is ideal. The subject matter of the book is presented in a logical sequence and the usefulness of the book is greatly enhanced by the excellent English style of the text. The reviewer did not detect any errors and the only omission noted was the name of the country in which the river Isar is located. The publication is primarily a text-book and the principles elucidated are explained at every turn by concrete examples from practice. The book abounds in references which are grouped in the Appendix in form for ready reference. In the Appendix are also given the methods for the preparation of the various culture media.

This book can be most highly recommended and should be in the library of everyone who wishes to become acquainted with the methods of bacteriological water examination and the interpretation of the results.

R. S. Weston.

Epidemic Cerebrospinal Meningitis. *By Abraham Sophian, M. D., Formerly of the Research Laboratory, Department of Health, City of New York. Cloth, 4°., pp. 261. Illustrated. $3.00. St. Louis, C. V. Mosby Co. 1913.*

It is a pleasure to review a book on cerebrospinal meningitis by one who has done so large an amount of original investigation in this field, as Doctor Sophian. Unlike many present-day writers, this monograph is not a mere collection of statements collected from the writings of others. What data have been collected from the literature are invariably combined with a well-reasoned analysis which leaves the reader in no doubt as to the author's belief or disbelief in their correctness.

The book is divided into six chapters dealing respectively with etiology, symptomatology, laboratory diagnosis of meningitis, complications, studies on blood pressure in meningitis, and, finally, treatment. Of the 261 pages making up the book, one hundred are devoted to treatment. Owing to the excellence of the entire work, it is difficult to pick out any one particular part of this monograph for special commendation. For those called upon to treat the disease, however, a careful study of the chapter on blood pressure and the chapter on treatment will prove invaluable. In fact, it is generally realized now that injections of the specific serum should always be controlled by observations in blood pressure in order to avoid risk of sudden death which otherwise sometimes follow such injections.

The book is well illustrated with photographs and drawings which add greatly to the value of the work.

Charles F. Bolduan, M. D.

Vaccine and Serum Therapy, Including also a Study of Infections, Theories of Immunity, Specific Diagnosis and Chemotherapy. *By Edwin Henry Schorer, B. S., M. D., Dr. P. H. Second Revised Edition, 4°, 300 pp. $3.00. St. Louis, C. V. Mosley Co., 1913.*

Rearranged, much enlarged and thoroughly revised, the present edition is in every way far superior to the first. Following a brief introductory account of infection and immunity the author makes a strong plea for adequate specific diagnosis as a prerequisite to specific therapy. Then comes an excellent description of various methods of identifying the cause of an infection and here are discussed microscopical examination of stained preparations, cultural methods, determination by presence or absence of specific antibodies, anaphylactic reactions, chemical and empirical tests, etc. The reviewer was surprised to find no mention of Friedberger's interesting work on anaphylotoxin or of Vaughan's studies on proteid split products. A discussion of immuno-therapeutics in general is followed by a chapter devoted to the specific diagnosis, treatment and prophylaxis of individual infections. The book is well written, the material well chosen, and the advice given practical and scientifically sound. Let us hope that the book will be widely read, especially by the many slipshod practitioners who by the employment of "shot-gun" injections of bacterial vaccines think to counteract careless habits in arriving at a correct diagnosis. The work may confidently be recommended to physicians and health officers desiring a general survey of an important branch of modern medicine.

Charles F. Bolduan, M. D.

Parasitology, A Laboratory Guide to the Study of Parasitology. *By W. B. Herms, Assistant Professor of Applied Parasitology, University of California. New York, Macmillan, 1913. 15 + 72 pp. 8 vo. $0.80 net.*

The importance of animal parasites in the causation of disease is becoming more and more impressed upon both physicians and sanitarians. It is, therefore, with particular pleasure that we welcome this first American text-book designed as an aid to the study of parasites in the laboratory. The book is an outline of work intended to occupy the student during a full college course of three lectures a week and two laboratory sessions of two and a half to three hours each throughout the academic year. Most of the work is to be done with prepared material, which must be considerable in amount, representing a large number of species.

The book is divided into an introduction and three parts. In the introduction is given a brief synopsis of the general principles of parasitology, which is continued in the introductory portion of Part I, entitled "Medical Entomology." The first four exercises of Part I are on the general anatomy of insects, with especial emphasis on the mouth parts. Most of this part is devoted to the study of various species of parasitic insects and arachnids. The last three exercises take up the protozoa. The forms studied are the Amoebae, the Trypanosomes, and the Malarial Parasites—one exercise for each of these groups.

Part II is on "Helminthology," and includes exercises in the study of round worms, leeches, flukes, and tapeworms, with one exercise in diagnosis by detection of eggs in feces, and one exercise on larval insects that occur as internal parasites.

Perhaps the most interesting and valuable part of the course is Part III, in which directions are given for the study of the life history of the house fly, the mosquito, and the flea. Although the work is outlined as three numbered exercises, it is not intended to be completed in three laboratory periods. The student is expected to collect the living material early in the year, to keep the specimens alive in the breeding cages, and to make and record observations on them in addition to his other work throughout the year.

On first examining the book, one cannot but feel a sense of disappointment that the treatment of the Protozoa is so meagre. Certainly one would expect one exercise at least on that very important group, the Coccidia. On the other hand, the treatment of the insects and worms is full and adequate, and one cannot do everything in a single college course.

Undoubtedly the book will be a great aid and stimulus to the teaching of parasitology; and if some enterprising naturalist can be induced to prepare and offer for sale series of preparations to be used in this connection, the very considerable difficulty of conducting such a course will be rendered much less formidable.

R. P. Bigelow.

The Modern Treatment of Nervous and Mental Diseases. *Edited by William A. White. M. D., and Smith Ely Jelliffe, A. M., M. D., Vol. II. Lea & Folbiger, Philadelphia, 1913. $6.00.*

The second volume of this excellent work admirably sets forth the opinions of both American and European authorities upon nervous and mental disturbances. To give a short review of all chapters would require much more space than is appropriate, so it has been deemed advisable to refer only to those articles which especially involve social, school or mental hygiene.

Dr. I. Abrahamson in Chapter III on the "Treatment of Muscular Atrophies and Dystrophies," suggests that, since the etiology of these conditions is not known, careful investigation into both endogenous and exogneous factors is paramount. The hereditary trait consists of a predisposition to certain diseases induced by disturbances in the metabolism, by blood disease, by various intoxications and other constitutional aberrations which possess in common a selective affinity for the nervous system, that is, an acquired tendency. Secondly there is an increased vulnerability of certain organs due to germinal anomalies of this inherited tendency. He urges prophylaxis in combating the neuropathic taint, first by the regulation of marriage, second by the prevention of conception and third by hygienic measures in tainted families.

Doctor Munson in Chapter IV on the

"Treatment of Epilepsy" has covered the subject in a concise manner. He meets the situation from all sides and advocates institutional treatment for all epileptics. The recent cases can be cared for with a possibility of cure. The chronic cases should be housed and labored. The non-productive cases, idiots and imbeciles, should be placed in institutions purely for custodial care. This segregation then limits the fitness to marry and in some states the limitation has been further extended to sterilization as a positive side for non-productiveness.

In the chapter on "Syphilitic Disease of the Nervous System," by Doctor Jelliffe, he states that nearly all forms of adult syphilis of the nervous system can be encountered in hereditary syphilis. He refers to cases of feeble-mindedness, hydrocephalus, ependymitis, Freidreich's ataxia, primary optic atrophy, different encephalitides, juvenile paresis and tabes dorsalis, as being cases encountered in hereditary syphilis. He refers in a short space to the element of sex and its relation to the present generation, and suggests what might be done by raising the standard of moral prophylaxis.

Doctor Scripture's chapter on "Stuttering" brings forth many factors exceedingly helpful to teachers and educators, in connection with the care and treatment of stutterers. He not only associates stuttering with physical causes, but also with physical factors, and offers in treatment psychotheraphy as well as re-education.

This work has been clearly written. The various writers have given their material in a clean-cut and forcible manner; the material has been carefully organized by the editors and brought up to date by every particular. It is a work not only for the specialist but also for the general practitioner.

Frederic J. Farnell, Providence, R. I.

Applied Bacteriology for Nurses. *By Charles F. Bolduan, M. D., Assistant to the General Medical Officer, Department of Health, City of New York, and Marie Grund, M. D., Bacteriologist, Department of Health, City of New York. 12mo of 166 pp. Illustrated. Philadelphia and London: W. B. Saunders Company, 1913. Cloth, $1.25 net.*

This book is divided into two sections, one dealing with the fundamental principles and the other with more specialized bacteriology. In the first section the authors outline the various methods for the study and cultivation of bacteria, the action of disinfectants and methods of sterilization. There is also a brief discussion of the paths of infection and immunity. Under the head of Special Bacteriology the authors, in short chapters, give a résumé of the more common diseases. They include the most common means of infection, the symptoms, and the methods to be used to prevent further spread of the disease. The part played by milk and water is also introduced.

As is stated in the preface the application to nursing is the important part and every thing is made to point toward that as an end. Its value lies in the distinct concise statement of facts. This makes it very useful in the hands of one who has only a limited time for the study of the subject. Throughout the book there are many helpful illustrations.

Ruth Bryant.

HEALTH DEPARTMENT REPORTS AND NOTES.

TO STATE AND MUNICIPAL HEALTH OFFICERS.

This new division of the Journal is specially designed to be of use to active Health Officers of the countries represented in the American Public Health Association. It will be unable to serve its true function unless the Health Officers are willing to coöperate by sending to the Journal copies of their reports, bulletins, new ordinances and personal information which will be of general interest. Furthermore it would be distinctly desirable if communications on subjects of general interest are submitted for publication in this division of the Journal. The management will further welcome any suggestions from Health Officers for the improvement of this division. All communications should be addressed to Selskar M. Gunn, Managing Editor, American Journal of Public Health, 755 Boylston St., Boston, Mass.

REPORTS.

Winnipeg, Manitoba

This year, as in previous years, we find the report of the Department of Public Health of Winnipeg among the best of all those received by the JOURNAL. It is a volume of 172 pages, well printed and illustrated with numerous full page half-tone engravings, illustrating typically good or bad conditions, and with charts and tables, well chosen and easily understood. It approaches the ideal inasmuch as it serves not only as a complete but concise report of the work accomplished, but also as a means of education in sanitary matters and a kind of sanitary survey of existing conditions for the benefit of the citizens of Winnipeg, and by its reports of methods used and its recommendations for future activities it has an especial interest to those who are interested in public health work in other localities.

Winnipeg is a city of about 166,000 population and while it is in general quite new and up-to-date it naturally is not perfect. While the expenditures of the Department of Public Health are omitted from the report, they are apparently high as indicated by the list of forty-five members of the official staff. The term "high" must not be considered as being used relative to the results obtained. A death-rate of 13.4 per 1,000 is reported. The birth-rate was 30.2 and the infant mortality rate, 199.5 per 1,000 births. Dr. A. J. Douglas, the medical health officer, points to this last figure as being altogether too high and proposes to take immediate and energetic steps to lower it.

The first thirty-four pages of the report are taken up by the report of Dr. Douglas who summarizes the other reports bringing out the more important features. Among the notable features of the work during the past may be mentioned the reduction of the tuberculosis death-rate from 123.6 per 100,000 population in 1910, when the work was started, to 94.2 in 1912; the tracing and suppression of a milk-borne typhoid epidemic of ninety-two cases; the installation of two new incinerators for refuse disposal; the listing by streets of all privies in the city to aid in plans for sewer extensions; education of the people by means of a monthly health bulletin, special newspaper articles, moving picture shows on sanitary subjects which have been seen by thousands and have done much to popularize the work, inauguration of a Little Mother's League in the schools, and by addresses before various gatherings; practical assistance to dairymen and restaurants by supplying free plans of modern sanitary construction.

Among suggestions for improvement in the future are: increased facilities for laboratory work; the addition of a child welfare division to the department with the employment of additional nurses and the inauguration of an educational campaign; the establishment of a dental clinic for school children; additional provision for the hospitalization of cases of contagious disease, and more stringent regulation in regard to reporting disease; the purchase of new and sanitary equipment for the collection of refuse; the promulgation of various laws, recommendations for many of which have been submitted in detail. These include the obligatory pasteurization of all non-tubeculin tested milk, the more thorough inspection of meat, the complete reconstruction of the Tenement House Law; and increased regulations for undertaking establishments and for maternity homes.

Worcester, Massachusetts

While the annual report of Worcester for the year 1912 is a small and unpretentious affair for a city of 160,000, the results reported indicate that the Board of Health is carrying on active and efficient work. The death-rate, excluding deaths at the State Hospital for the insane, is 14.33 per thousand, a rate slight'y higher than that for 1911 but lower than the average for the past ten years. The rate of deaths of infants under one year of age to total births is 129.2 per thousand.

The tabular arrangement of statistics is clear and instructive in general, although it might better be rearranged, omitting some parts which are duplicated or unimportant, and introducing or enlarging upon certain features which are slighted. The international system for the classification of deaths is used.

During the year of 1912 a school nurse was employed for the first time and has accomplished a great deal. School physicians are also employed and carry out regular inspections. They also report the vaccination of 2,748 children during the school year. The chief needs of the health department at the present time is more imspectors, a scarlet fever ward in the isolation hospital and an additional city nurse. Plans have already been completed and the appropriations made for a new incinerator and for a tuberculosis hospital which will be completed during the present year.

Harrisburg, Pennsylvania.

The Board of Health of Harrisburg, a city of about 67,000 population, presents its report for the year 1912. The president of the Board states that many greatly needed improvements are prevented by lack of money. Among the needs which he mentions are the following: annual census of the city, to be taken by the police; two additional assistants to the health officer; legislation and inspection which shall lead to improvements in food supplies and housing conditions; a new municipal hospital for infectious diseases; increased facilities for bacteriological diagnosis of disease; a remodeling of the present system of garbage disposal, for which two thirds of the whole appropriation for health work was expended during the past year. He also complains of the lack of laws which are able to handle existing conditions and of the criminal negligence of many of the physicians in regard to reporting contagious disease and advising quarantine.

The death-rate for 1912 was 14.18 per thousand, the birth-rate 19.85, and the death-rate for children under one year was 118 per thousand births; 1,250 cases of measles were reported during an epidemic which lasted through the spring.

DEPARTMENT NOTES.

Barber Shop Sanitation.

"Barber shop sanitation was accorded its proper attention in January, 1912, when the Department of Health employed a trained man, on full time, to look after this work. Mr. Patron, have you noted the results?

"One may have a reasonable sense of security when he rests his head on the freshly sterilized linen or the paper towels which most of the proprietors are supplying.

"Barbers are required to sterilize the razor blade before shaving a customer and after stropping. A germicidal solution of trikresol may be found in most shops; other shops depend upon boiling water. Some of the better shops are installing apparatus for the sterilization of all instruments. Notify the Health Department if your barber fails to sterilize the blade before he shaves you.

"Hot running water is one of the requirements in the barber shop regulations. Many makeshift devices were 'good enough' when inspection was begun. Barbers are required to cleanse shaving mugs and brushes in hot water before and after use.

"Before barber shop inspection was instituted there was a temptation to use a common sponge first on one man, and then on the other, without the intervention of sterilization. An individual cup in some places only gave a false sense of security. Sponges are forbidden and so is the powder puff—that medium for the friendly interchange of transmissible skin diseases.

"A few years ago it was not uncommon to have one towel for several patrons. Note the change the next time you 'get a shave.' See how many clean towels are used on you alone.

"The department requires that styptics used to stop the flow of blood after accidental cuts, be in powdered or liquid (consequently individual) form. No longer can the barber reach into his pocket and rub into your open cut a foul germ-laden piece of alum.

"No person suffering from venereal disease or other communicable disease shall act as barber.

"The Health Department is doing its best to protect the public against diseases which may be acquired in barber shops. With few exceptions proprietors are heartily in sympathy with the movement.

"Inspections are made once a month. As an expression of appreciation of the good efforts and results obtained the department issues to each shop owner a certificate giving the rating of his place. A man who has a Class AA shop will want the public 'to be in on the secret.' He will put the same in a conspicuous place. Does your barber show such a certificate?"

Weekly Report of the Board of Health of Cincinnati, Ohio, November 15, 1913.

Sanitary Standards for Bakeries.

Adopted by the National Association for Master Bakers.

"1. Building well lighted in every part with natural light, and thoroughly ventilated; air supply free from contamination by surface dust.

"2. Floors, wall and ceiling of impervious materials with smooth surfaces and kept clean. Rooms kept free from vermin and screened against flies.

"3. Plumbing, drainage, etc., ample to remove waste and prevent dampness, and kept in good order. Sanitary toilets, shut off entirely from bakeshops and storage rooms.

"4. A plentiful supply of pure water, convenient and adequate washstands and supplies.

"5. Garbage, refuse, etc., stored in tightly covered cans and disposed of quickly.

"6. Machinery, tools and other equipment so made, installed and used as to facilitate cleanliness and safety.

"7. Stables so located and kept disinfected as to prevent odors from same reaching bakery.

"8. Methods of distribution such as to

protect bakery products from contamination between the oven and the home.

"9. A health certificate showing freedom of all employees from skin diseases, tuberculosis, venereal and other contagious diseases. Spitting and the use of tobacco in the bakery prohibited.

"10. Employees of bakeries should be properly clothed in clean, sanitary clothing."

Bulletin Chicago School of Sanitary Instruction, November 8, 1913.

The Overcrowded Street Car.

"The over-filled street car is a great American menace. In Louisville on some lines, especially during the 'rush' hours, human beings are packed closer than the humane society would allow anyone to pack creatures who lack immortal souls. A street car crowded to its greatest capacity, all the seats occupied, the aisles jammed with people clinging to straps, swaying against each other, many of them coughing and sneezing, is exceedingly dangerous to the public health. Under such conditions the air breathed is filthy and germ laden, from diseased throats and lungs, and head colds in active stages. One or two small ventilators, even if always open, are not sufficient.

"All that is necessary to improve this condition is to put more cars on during the rush hours, and allow only a certain number of passengers to each car. They should not be allowed to stand in the aisles. In most of the cities of Europe, the street cars are plainly marked with the seating capacity of the car. When the car contains this number of passengers, no more are taken. If European city governments have fully and effectively succeeded in regulating their street car accommodations, why cannot we do it in Louisville?"

Health and Hygiene Department of Health, Louisville, Ky., November 1, 1913.

A Diploma Now Required of Midwives.

"While it is undoubtedly true that the standard required of midwives is higher at present than it was several years ago, before the Department of Health took an active interest in its elevation, it must be confessed that the standard in this city left a good deal to be desired, and was much lower than that in many European countries. With the object of remedying this deficiency, the department has decided that in future it will require the presentation of a diploma or certificate showing that the prospective midwife is a graduate of a midwifery school before a permit to practice will be issued to her. The resolution embodying this intention was passed at a meeting of the board of health on the 14th day of October, 1913, and reads as follows:

"Resolved, That the rules governing the practice of midwifery in the city of New York, adopted by the board of health, November 8, 1907, be and the same hereby are amended, so as to read as follows; the same to take effect on and after the 1st day of January, 1914:

"Rule 3. The applicant must be twenty-one years of age or upwards, of good moral character, and able to read and write. She must be clean and constantly show evidence in general appearance, of habits of cleanliness.

"The applicant must also present a diploma or certificate showing that she is a graduate of a school for midwives registered by the Board of Health of the city of New York as maintaining a satisfactory standard of preparation, instruction and course of study, but the requirement of a diploma shall not apply to any person who is now or heretofore has been authorized to practice midwifery by the said board."

Weekly Bulletin of the Department of Health of the City of New York, October 25, 1913.

The Importance of Keeping Hands Clean.

"Probably the commonest way in which infections are implanted within our bodies is from hand to mouth.

"Our hands are more or less constantly coming in contact with infectious matter and they are more or less constantly going to our mouths; if not into them, they handle and infect the things which we put into them.

"It is, therefore, intensely important that we shall always keep our hands as clean as possible by frequent washing.

"Hand washing is necessary:

"*Immediately* before eating.

"*Immediately* before handling foodstuffs, in course of preparation or serving.

"*Immediately* after necessary toilet attentions.

"*Immediately* after handling the sick or articles from a sick room.

"*Immediately* after handling any dirty article.

"Persons charged with the preparation or handling of foodstuffs and those engaged in the care of the sick should be especially careful about their hands. A cook with dirty hands is liable to infect every person who eats the foods she handles. A nurse with infected hands can readily spread disease.

"In washing give special attention to the cleansing of the spaces under the fingernails. Use lots of soap, warm water and a good hard bristle brush.

"Keep your hands clean and you will avoid many unnecessary infections.

"Look to your cook's hands—that's a test of her efficiency and of your safety at her hands.

"Immediately dismiss a nurse who is careless about the condition of her hands.

"These are simple, every-day matters—but they count mightily. Dirty hands will hand you trouble."

Bulletin, Chicago School of Sanitary Instruction, November 1, 1913.

Control of Disease in New York Schools.

"The modern conception of the transmission of infectious diseases has led to certain modifications in the attitude of the Department of Health in regard to its methods of dealing with these diseases in reference to the schools.

"Cases of scarlet fever are excluded from school for at least five weeks, or until desquamation is complete and all purulent discharges have ceased. If quarantine is observed by the family, children and others who have had the disease may return to school. If children or other members of the family, who have not had scarlet fever, are immediately removed to another address, they may return to school at the end of five days, if, in the meantime, they do not develop the disease, but they must present a special school certificate issued by the department. If they continue to reside at home, they cannot return to school until the case of scarlet fever has been officially discharged by the Department of Health.

"In the case of measles, the patient is excluded from school until five days after the appearance of the rash, at which time, if he is otherwise well and all catarrhal discharges have ceased and the cough has disappeared, he may return. Children, and other members of the family who have had the disease, may continue in school provided that quarantine at home is properly observed. Children or other members of the family who have not had the disease, and are immediately removed to another residence, may return to school at the end of fourteen days, the usual limit of the period of incubation, upon presentation of a special school certificate issued by the Department of Health; if continuing to reside at home they must not be readmitted until the case has been officially discharged by the Department of Health.

"Children suffering from German measles are excluded for one week, at the end of which time they must be seen by a school medical inspector and will be readmitted on his certificate. Other members of the family who have not had the disease, are excluded until the school medical inspector recommends their readmission. Children in the family who have had the disease may remain in school.

"Children suffering from chickenpox are excluded from school until all scabs have disappeared at which time the child must be seen by a school medical inspector and readmitted on his certificate. All other children of the family who have not had the disease are excluded until the school medical inspector recommends their readmission. Children in the family who have had the disease may remain in school.

"Children suffering from whooping-cough are excluded from school until the whoop has entirely disappeared, which, generally speaking, means from six weeks to two months. In public, parochial and all other free schools, a child must be seen by the school medical inspector and be readmitted upon his certificate. In private schools, the child may be readmitted on the certificate of his own physician. In either case the child must be again excluded if the characteristic whoop should recur.

"Children suffering from mumps are excluded until the swelling has entirely subsided. In public, parochial and other free schools, the child must be seen by the school medical inspector and be readmitted upon his certificate. In private schools, the child may be readmitted on the certificate of its own physician. All children of the family who have not had the disease are excluded until the school medical inspector recommends readmission. Children in the family who have had the disease, may remain in school.

"Children suffering from diphtheria are excluded for a minimum period of one week and must not be readmitted until all symptoms have disappeared and the culture is negative. A certificate from the Department of Health must be presented upon readmittance. If quarantine is observed, children and others who have been immunized against the disease and cultures from whose throats do not show diphtheria bacilli, may return to school. If children or others in the family are immediately removed to another address and culture taken from nose and throat is negative, they may be readmitted but must present a special school certificate issued by the Department. If continuing to reside at home and the above precautions are not taken, they cannot be readmitted until the case has been officially discharged by the Department of Health.

"When a teacher is a member of a family or household in which a contagious disease occurs, the teacher must be excluded, except that continuance at school may be permitted at the discretion of the department. A special certificate must be issued for this purpose."

Monthly Bulletin, New York City Department of Health, August, 1913.

Popularizing Registration of Births.

How to get complete vital statistics is a problem everywhere and although laws and penalties are necessary and to some extent beneficial it is probable that instruction of the public as to why such reports are necessary will probably accomplish much more permanent improvement. The *United States Public Health Report* for October 24 tells of how the Indiana Board of Health is working to get more complete registration of births.

"The Indiana State Board of Health is exerting itself to secure more accurate birth reports and has adopted a plan to bring the importance of birth registration before the women. The board has a traveling exhibit, passing from town to town, spending one week in each place. This public health exhibit consists of charts, diagrams, mottoes, pictures, maps, photographs, pathological specimens, etc. The exhibit is usually displayed in an empty storeroom with banners across the street to attract attention. The coming of the exhibit is announced in the schools and churches, and advertised in the local papers two weeks ahead. The exhibit is under the charge of two men who do nothing else. They carry a stereopticon, showing both still and moving pictures, and give illustrated lectures twice a day. The schools are visited, the pupils receive special instructions in general hygiene, the teachers and school authorities are assembled, and the social clubs of the town join in the work.

"Dr. Hurty, secretary of the State Board of Health, states that the special feature adopted this year is to arouse an interest among the women in birth registration by offering a prize to the young married women who will present the most names of other women promising to talk up the necessities and advantages of accurate birth registration. The prize which will be offered is a year's subscription to the *Mothers' Magazine*.

"The Indiana State Board of Health is preparing a Mothers' Baby Book. It will be bound in cloth, and treats simply and briefly of the care of the baby. This book will be sent to every mother when her first child is born, together with a letter of congratulation from the board. The letter will have something to say regarding registration, and will, therefore, advance that particular feature."

The Toothbrush as an Infection Carrier.

While the article which recently appeared in certain of the sensational newspapers advocating the use of sterile water for brushing the teeth in order to avoid introducing bacteria into the mouth seemed rather ridiculous to sanitarians; we now find the Chicago Board of Health advocating the sterilization of the toothbrush after each use. It cannot be denied that the average toothbrush is far from clean but it is perhaps better worth while to bend our energies toward the popularization of the toothbrush among the masses rather than its sterilization among the classes. The following article, clipped from the *Bulletin of the Chicago School of Sanitary Instruction*, however, points out some of the possible dangers attending the use of the toothbrush without proper safeguards:

"A case of diphtheria recently reported from a Chicago orphanage has resulted in observations and laboratory investigations which point to the toothbrush as a possible carrier and spreader of infections, especially in children's institutions, including schools, where the practice of tooth washing—toothbrush drill—entails the hanging of scores of brushes side by side in the intervals between use. While disinfecting the orphanage in question, our quarantine officer, a graduated dentist, had his attention drawn to a long row of toothbrushes arranged in a numbered rack attached to the walls of the lavatory immediately above the battery of wash bowls. Upon close inspection of these toothbrushes it was observed that some were filthy, the bristles being choked with débris, mostly organic matter in the nature of strings of meat. It was immediately recognized that brushes in this condition would be natural incubators for disease germs and in view of the close proximity of the brushes and the possibilities of contact and the danger of exchange by the users, it was seen that they might be active disseminators of disease.

"With this suspicion in mind the quarantine officer ascertained the number of the brush which had been used by the diphtheritic inmate of the orphanage and from this made a number of cultures. The laboratory findings positively indicated the presence of the diphtheria bacilli in large numbers in this brush. Unfortunately all other brushes on the rack were subjected to sterilization before further culturing was done.

"For school or institutional use a simple and inexpensive outfit could be made from a glass test-tube about one inch in diameter and seven inches long. Place cotton (for saturation) in the bottom of the tube and fit a tight cork into the open end of tube. The brush may be placed in the tube, the bristles in contact with formalin-saturated cotton, or it may be suspended from a hook attached to the inner end of the cork.

"On removal of a brush from these formalin containers, rinse it well with cold water and before replacing it in the container give it another thorough washing.

"Brushes so kept will not only be sterile but will have a refreshing odor and will retain a desired firmness of the bristles for a longer period of time.

"Another advantage which suggests itself in this treatment of the brushes is that a little formaldehyde, a tissue hardener, may be retained in the brush and applied with benefit to the soft, sensitive gums of those who suffer from pyorrhea alveolaris, a disease which causes teeth to loosen."

Typhoid Fever in New York during the First Six Months of 1913.

During the first six months of 1913, the reports of the Department of Health of the city of New York show that New York City was remarkably free from typhoid fever; more so, in fact, than during any previous semi-annual period. This is shown in the following table:

First six months of year.	Cases repoited	Deaths.
1908	792	169
1911	762	148
1912	897	169
1913	467	91
Five year average, 1908-1912	824	167

"The figures for 1913, as shown above, are not only relatively but absolutely less than those for any corresponding period since the incorporation of the greater city, and, in view of the steadily increasing population, the relative comparisons become even more marked. Thus, in 1908, there were eighteen cases per 100,000 of the population; in 1912, 17.6 cases, and in 1913 only 8.8 cases. It is probable that a number of favorable influences have contributed to this notable decrease. In the first half of 1913 there were fewer out-of-town infections and fewer secondary infections from the cases occurring in the city. The latter circumstance is partially accounted for by the anti-typhoid immunizations which, since the beginning of the year, have been performed by the department upon persons exposed to the disease.

"It can hardly be doubted that the improved quality of New York City's milk supply, due in great measure to the pasteurization enforced by the department's regulations, has been prominent among the local factors causing the favorable showing in the total decrease of cases. From the fact that the cases originating in the city were not localized at any time to a single district or districts, it would seem that few, if any, could be attributed to an infected water supply. The educational campaign so persistently pursued by the department for the past several years is undoubtedly producing results. The general public have a better understanding of the proper method of handling typhoid cases occuring in their homes, and some of the press comments on the work of the department have undoubtedly aided, by instructing people generally in regard to the prevention of infectious diseases. It must, of course, be admitted that the number of cases of typhoid fever may again increase in number, and we must never lose sight of the fact that it is not wise to draw too hastily deductions to our own advantage from seeming cause and effect, but the figures given above are certainly cause for congratulation so far as they go."

New York Medical Journal, October 4, 1913.

Measles Pointers.

The public does not generally understand the true danger which accompanies a case of measles and the unfortunate custom of exposing a child to the disease in order "to have it over with" still exists in too many localities. The following pointers from the *Texas Board of Health Bulletin* are worth repeating:

"Measles is an extremely contagious disease and among infants it is highly fatal.

"Ninety-five out of every hundred deaths from measles are among children under five years of age.

"It is the height of absurdity to expose a child to measles so that 'it may have it and get over it.'

"Measles frequently terminates fatally—bronchial-pneumonia being among the commonest and most fatal complications.

" 'Black measles' is the malignant type of the disease and very fatal. The blackish color is due to hemorrhages in the skin.

"The contagion is thought to be present in the particles of mucus in the secretions of the mouth and nose.

"It develops in from seven to eighteen days after exposure, usually fourteen.

"The disease is especially contagious before the eruption appears.

"A 'feverish cold,' sneezing, running at the nose, cough, and red, watery eyes are the early symptoms.

"These symptoms increase until the third or fourth day, when a rash appears.

"Immediately isolate a child showing symptoms of measles—the earlier the better.

"A measles case must be kept in quarantine until the temperature remains normal for forty-eight hours.

"Children exposed to measles, who have not had the disease, must be isolated—kept entirely away from other children—for a period of two weeks after last exposure.

"All articles coming from a measles patient room must be sterilized.

"If your child 'seems to have caught cold' after measles, look out for tuberculosis. Consult your doctor."

Sanitary Survey of Cambridge, Mass.

The sanitary survey habit is spreading rapidly and Cambridge, Mass., proposes to survey itself. Although most cities would obtain better results by calling in the assistance of experts especially trained in this work, such as those of the Russell Sage Foundation, with such a man as Professor Whipple to head its commission Cambridge may expect excellent results. The following note is clipped from *The American City* of November.

"From Harvard comes the announcement that Mayor J. Edward Barry has appointed two of the University professors as members of the Sanitary Commission of Cambridge. The commission now comprises: chairman, George C. Whipple, Professor of Sanitary Engineering, Harvard University; secretary, Dr. B. J. Peirce, Medical Inspector, Board of Health; James Ford, Professor of Social Ethics, Harvard University; Lewis M. Hastings, City Engineer; Edwin W. Quinn, Superintendent of Streets.

"That the commission has very important work ahead of it is indicated by the following outline of its objects:

" 'To undertake a comprehensive investigation of the sanitary conditions of the city of Cambridge, to ascertain the relations between them and the health and physical comfort of the people. To this end it is proposed: First, to enlist the coöperation of the various city departments, and of such existing associations as are already considering particular phases of the problems; second, to undertake such original studies as may be necessary; third, to conduct a campaign of public interest in municipal cleanliness, especially in those sections of the city where the population is most dense; fourth, to recommend to the city government from time to time such sanitary improvements as seem desirable; fifth, to publish ultimately the results of the findings of the commission as a matter of historical interest.' "

Sterilization of Bathing Suits.

"During the summer a business was established opposite the municipal baths at Coney Island for the purpose of hiring out bathing suits to bathers, and it developed that the Department of Health, under section 26 of the Sanitary Code, which relates to bathing beaches, could not enforce the proper sterilization of these suits. Section 26 was, therefore, amended at a meeting of the Board of Health, held October 28, 1913, in order to remedy this defect. The entire resolution is lengthy and it hardly seems necessary to quote it in full. The amendment adds that 'bathing suits shall not be hired out . . . without a permit in writing from the Board of Health and subject to the conditions thereof.' "

Weekly Bulletin of the Department of Health of the City of New York, November 1, 1913.

Manure Production.

The September number of the *Department of Public Safety* of Rochester, N. Y., contains the following rather interesting figures on manure production and its relation to the fly problem. It is almost enough to make one give up hope and conclude that the automobile is the only solution.

"There are 15,000 horses in the city. It is not necessary to inquire what the average intake of each horse amounts to, but the average output consists of thirty pounds of manure and eight pints of urine per day. It means that the 15,000 horses deposit on the streets and in the stables of Rochester over 82,000 tons of manure annually. Now, a three-ton load of manure occupies a space 14 x 4 x 5 feet; hence the total manure output of the city would make a pile covering an acre of ground 175 feet high. If every pound of manure exposed furnished a breeding place for 100 flies, then we would have as a result of this large pile of manure 16,400,000,000 flies. To show that this quantity of manure per animal is not excessive, we have verified our estimate and find that one large concern in the city with 200 horses has about 1,200 tons of manure to dispose of annually.

"The meaning of these figures is intended to convey to our minds the fact that we can no longer rely upon the slogan 'Swat the Fly,' that to get rid of the fly we must starve it. All manure and sweepings and other wastes must be carefully housed. All food, and everything upon which the fly can possibly breed or feed must be covered. Fly traps must be baited and cared for especially at this time of year when some of the remaining flies get into winter quarters and furnish enormous progeny for the next year. Every fly must be swatted; but more than all else, we must clean up so that there is nothing upon which the fly may feed; no decaying material in which to lay its eggs. 'Starve the Fly' must be the new slogan."

Elimination of Raw Milk from Grade B.

"Holding that the protection of the public health now requires that all milk used in New York City, except certified milk and similar special grades, should be either pasteurized or brought to the boiling point before it is consumed, the board of health at its last meeting adopted a resolution forbidding the sale of any raw milk for consumption on the premises, and amended the Sanitary Code and the rules and regulations for the sale of milk to remove from Grade B the class of raw milk which was formerly permitted to be sold under that designation. The effect of this amendment of the milk regulations, which takes effect February 1, 1914, is to limit the sale of raw milk in New York City to milk which conforms to the requirements of Grade A. Only milk produced under exceptionally stringent requirements as to cleanliness can now be sold in the raw state.

"The requirement relating to the sale of milk for consumption on the premises, which is to take effect immediately, is a matter which particularly concerns the patrons of restaurants, hotels and lunch counters as well as the proprietors of these places. Hereafter when a glass of milk is purchased at a restaurant, hotel, lunch counter, milk booth or any similar place the purchaser may know that the law requires that this milk should be pasteurized unless it is Grade A milk. This grade includes certified milk, guaranteed milk and inspected milk which has been pasteurized.

"A study of the cases of typhoid fever which occurred east of Broadway and south of 40th Street during September indicated to the department beyond any reasonable doubt that a certain supply of Grade B raw milk was the means of transmitting the infection in a large number of the cases, and raw milk has, therefore, been eliminated from Grade B. This action should be considered as the latest step in the execution of a carefully developed program under which the Department of Health for the last four years has endeavored gradually to bring about the pasteurization of the entire supply of general market milk of New York City. Commissioner Lederle has repeatedly expressed the opinion that under the present conditions of production and consumption of the milk supply of New York City, the only means of insuring safety from the transmission of infection while keeping down the price of milk was to adopt the requirement of pasteurization on a large scale. By the adoption of the grading system and by increasingly stringent regulations the department in the last four years has been able to to raise the proportion of pasteurized milk to the total supply of New York City from 7 per cent. to 75 per cent. At the present time, out of a total average daily supply of 2,000,000 quarts of liquid milk, it is estimated by the department that an average of 1,500,000 quarts is pasteurized. The adoption of the latest regulation requiring the pasteurization of all except the highest special grades of milk (which constitute an almost negligible percentage of the total supply) will mean that practically all milk sold in the city after February 1, 1914, must be pasteurized."

Weekly Bulletin of the Department of Health of the City of New York, November 8, 1913.

PUBLIC HEALTH NOTES.

The Cure of Typhoid Carriers.

"A prize of £500 has been offered by an anonymous donor to be awarded without distinction of nationality to the person who discovers a cure for chronic typhoid carriers. Papers must be written in German and addressed, before 1st October, 1914, to Prof. von Schjerning, president of the Competition Committee, 86, Wilhelmstrasse, Berlin. The committee is composed of Profs. Ehrlich, Gaffky, Kraps, Uhlenhuth, and Hoffman. Experimental work must be described in detail, so that it can be immediately controlled."

The Medical Officer, September 27, 1913.

Use of Ultra-Violet Rays.

"At Marommes les Rouen, a suburb of Rouen, France, a large public water supply with an output of 100,000 gallons of water a day, is being purified by means of ultra-violet rays. The plant has been installed for nearly three years and is said to have been operated with complete success.

"The water is first filtered through sand and the ultra-violet rays apparatus sterilizes the water at the rate of 100,000 gallons per day by means of a single one-horse-power lamp."

The American City, December, 1913.

And This the Twentieth Century?

"It is reported that a leper was brought from the West in a box car in order to be deported, and that when he left the car at the port of sailing, the car was burned. And yet leprosy in this country has not a fraction of the infective power that tuberculosis has. What would one think of burning a box car because a consumptive had ridden in it? It is the unusual that we fear, which shows that we are not so much different from the primitive savages. We can sleep in peace when typhoid fever (which kills one hundred thousand to one of leprosy in this country) is right under our noses. We hardly take interest in the fact, which has been proved, that typhoid carriers are in our dairies and in our restaurants, and we do not even successfully prevent the access of typhoid flies to our dining-tables; and if a member of the family departs by the typhoid route, it is taken as a matter of course and soon forgotten. Yes, we may even eat raw oysters from beds not above suspicion of typhoid contamination; but if a leper rides in a box car, *burn it!*"

Life and Health, December, 1913.

Railway Sanitation.

"The advance of the railways of the country in applied sanitation has been marked. When one recalls the conditions allowed to exist in railway cars twenty years ago the present state of cleanliness is comparatively satisfactory. The railways are, indeed, to be commended for their gradual introduction of hygienic regulations that keep their cars, in spite of the numbers of people who travel in them every day, in a state that is not likely to endanger health. There remains, however, one phase of railway sanitation that will soon have to be dealt with. Though it is a difficult phase, there is no doubt that improvement of present conditions must come without delay. It would seem to be better for the railways to take up the problem of their own initiative rather than be forced into it by legal regulation. This is the present mode of disposing of the sewage of trains. In former years when population was less dense and when trains were not nearly so frequent and crowded, it was perhaps not so much to be deprecated that the railways should scatter sewage over the right of way. Now that railways cross thickly populated tracts of territory, and express trains pass through towns of considerable size without stopping, the crude disregard of hygiene in this matter is entirely out of keeping with present-day sanitary science, particularly as the railway rule is to have the toilets locked only during the times of stopping at stations, which gives opportunity for the scattering of offensive material, distinctly dangerous to health, even on the streets of towns. Railways frequently cross streams that are connected with water supplies, and the present custom may well prove a source of contamination of drinking water. Now that we are carefully disposing of sewage in connection with our cities and are no longer allowing ordinary water ways to be contaminated as formerly, protection of our smaller streams will surely come to be felt as a necessity."

International Hospital Record, August 20, 1913.

Rural Sanitation.

Although public health work is growing rapidly in popularity it is too largely confined to cities, at least in the United States. Rural districts, although perhaps normally more healthful, suffer from their ignorance of sanitary matters. *American Medicine* (October, 1913) reviews an article from the *Medical Review of Reviews* which deals with this subject. We quote the review entire:

"H. N. Ogden calls attention to the fact that the diseases in the rural population are not chiefly the contagious diseases which form so conspicuous an item in the general death-rate of the country at large.

"As there is no congestion in the population of the rural districts there is slight tendency to the spreading of disease. On the other hand, the high death rates are from lung diseases, influenza, liver and kidney disease and constitutional disorders in general. Efforts in rural sanitation should, therefore, be directed to the education of the farmer in matters relating to personal hygiene. There are no restrictions in the country as to the sanitation of buildings and grounds, such as obtain in cities. Consequently improvement in hygiene must come from instruction rather than from authority, and health officials should, therefore, improve every opportunity to teach sanitary laws. Many health officers may reply that they are not hired to do work as teachers. If this is true it means that their particular departments of health are badly organized and require reconstruction.

"The following suggestions are offered as indicating hopeful lines of work:

"(1) The granges of the state offer the most attractive possibilities in this direction and a health officer could find pleasant and useful employment at their meetings.

"(2) There should be coöperation with the rural school superintendents and discussion of sanitary matters in the various school houses.

"(3) Instruction may be given to the children of the country schools by their teachers after the latter have been properly posted by the health officer on the subjects upon which they should be informed.

"(4) The health officer can occasionally work with the pastor of the rural church, addressing the people on sanitary matters, on suitable occasions, at the church.

"In all these points the department of health is only in line with the tendencies of the times when it attempts to give to rural inhabitants the same advantages with regard to public sanitation which are enjoyed by the cities."

Personelle of Health Boards.

Too often the members of a board of health are elected because they are "well-intentioned respectable citizens" rather than because of any peculiar qualifications for the position. The suggestion that insurance agents should make the most practical health workers may not appeal to all, but certainly more thought should be used in selecting members than is usually the case. The *Engineering Record* of November 8 discusses the subject from the engineers' standpoint:

"Elsewhere in these columns will be found a discussion of engineers' qualifications for places on public service commissions. But there are posts of lesser importance in which engineers could with great benefit serve their communities. One of these—on boards of health—was strongly brought to mind by a recent editorial in the *New York Times*. Commenting on appointments made by the mayor of New Rochelle, N. Y., the editorial said: 'The board as now constituted consists of a liquor dealer, a grocer, a seller of shirtwaists, a man of leisure, a newspaper humorist, and the one doctor upon whose presence the law insists. And the one doctor, as it happens, is an eye and throat specialist, so his knowledge of and interest in preventive medicine as related to municipalities must be in inverse ratio to his proficiency along his own line. These selections, at once so absurd and so outrageous, have been received in New Rochelle with perfect equanimity by a great majority of the inhabitants. Only a minute and ineffectual minority deems the matter worthy of comment. The rest, if questioned on the subject, seem surprised that anybody should be interested in it, and, if pressed for an expression of opinion, say, 'Oh, the commissioners are all respectable citizens, honest, well-intentioned, and good neighbors.' So they are. It is not the intention here to cast any reflections upon them as individuals, or upon their several businesses as such. But what imaginable connection have the virtues mentioned with the protecting of a city from disease, with the drafting and enforcing of sanitary ordinances? Not even echo has any reply to make; so one can safely assume that there is none.' While this vigorous expression is much to be commended, one cannot but inquire whether subsequent cogitation would lead the *Times* to the realization that even a board composed entirely of physicians would not be wholly satisfactory. Municipal sanitation is not a problem of 'preventive medicine.' It is primarily engineering. Purity of water supply, disposal of sewage, collection and disposal of garbage, street cleaning, tenement-house sanitation—these are the main problems affecting the well-being of citizens. No board of health is properly organized unless its engineering representation is strong. To say that the board can employ engineers is only to put up the strawman so often and easily disposed of. The employed engineer is only an employee; the engineer on the board has equal authority with his colleagues. His judgment will be accepted as final where that of the employed engineer will be waved aside without a thought."

Boys for Sanitary Inspectors.

American Medicine for September comments editorially on a new method for keeping the streets clean:

"Using boys to keep the streets clean was the happy inspiration of Policeman Miller of New York City—all honor to him! He organized some street urchins into a sanitary squad of inspectors who reported to him any instances where peddlers or housewives threw rubbish into the streets. A few prosecutions convinced the culprits that health laws are serious matters, not fads of the finical. East Broadway, which was said to have been the dirtiest street in the world, is now the cleanest. Everyone knows that the easiest way to have clean streets is to prevent the dirt and yet the majority of city residents seems to think that the proper thing to do with small rubbish is to throw it into the streets. Shop keepers have been notorious offenders and do not hesitate to spread their sweepings on the sidewalks for the wind to scatter. We have long preached from the tent that we could not end the present customs of city savages, until we had convinced the best of them that their ways were wrong, and that the best way to reach them was through the children. Every child should be taught in school that cleanliness is next to godliness, and in a little time there would be good fruit. But this millerite idea of giving the boys large bright nickel badges as a sign of authorized inspectorship was nothing short of genius. Boys are essentially good—what goes for badness is generally a result of fun-loving propensities. They are emotional and can easily be won to any good cause, particularly if decorated with a badge and clothed with a wee bit of authority to flatter the self-esteem which so early manifests itself and which should be cultivated still more. Many a temptation to commit crime would be resisted if the boy had more self-respect. So we heartily approve this new movement, because it helps the boys as much as it helps sanitation. Indeed, everyone should be an inspector for we are all vitally interested in the future city beautiful. We wish all policemen would do as

Miller has done—and then perhaps the commissioners themselves might do something along this line. We must end the practice of throwing garbage, rubbish, papers or dirt of any kind into the streets, and then the problem of cleaning up the unavoidable filth will be easy. Let the fines be big enough to pay for the cleaning."

Anti-typhoid Vaccination.

An article originally published in the *Medical Record* for October 4 is reviewed as follows by the *New York Medical Journal*:

"A. H. Doty states that his intention is not to minimize the value of this form of treatment within reasonable limits and in the hands of those properly equipped to administer it, but rather to inquire into its range of usefulness and to suggest that we carefully consider its defects, as well as the protection it extends. Having pointed out the differences between this and vaccination for the prevention of smallpox, he says that the protection of soldiers and sailors against infectious disease is a responsibility which very properly rests with the medical officer in charge; furthermore these men are employed for the protection of the public, and must be prepared at any moment to deal with emergencies. In connection with this duty they are frequently transferred from one place to another, and may often be exposed to very bad sanitary conditions; therefore unusual or more extended means of safeguarding their health is justifiable. There are other emergencies in connection with outbreaks or anticipated outbreaks of typhoid fever, and also other conditions, where the vaccine may be useful. He does not believe its employment advisable, however, as a preventive measure in hospitals, stating that is it is depended upon, in some way relaxation will take place in the enforcement of the sanitary measures which are imperative in the care of typhoid. During the past year the public in various parts of the country, and particuarly persons about to travel, have been officially advised to secure the benefits of the anti-typhoid vaccine, but he does not think a general recommendation of this kind proper or wise. Nor does he accept the statement that this means of prevention involves no risk, for it is generally conceded that any acute infectious or organic disease, or impaired health, contraindicates the use of this measure. Hence, those in charge of the public health should deal in the most cautious and conservative way in approving or recommending a serum or vaccine for general use. Doctor Doty believes that those who will give this subject careful consideration will be convinced that the employment of anti-typhoid vaccine as a preventive measure should be strictly confined to conditions or emergencies where it is deemed justifiable to carry out special means of protection. Under these circumstances unpleasant results may be avoided, and the public mind will not be disturbed, or its faith weakened in modern sanitary methods in which its coöperation is so urgently needed and which are so essential to the preservation of health."

Medical Inspection of Schools.

Dr. C. P. McCord, medical inspector of schools of Albany, N. Y., publishes an article the *Albany Medical Annals* for November on "Health Direction in Public Schools." In view of the rapidly growing interest in this phase of health work there will be many who will wish to read the whole article, of which only a small portion is quoted below:

"Medical inspection constitutes a specialty as much as laryngology or otology are specialties. The work has not found a place in the curricula of many of our best medical colleges, and I know of but two American medical colleges which offer courses on the diseases of children of school age and on social pediatrics. In view of the fact within the next few years several hundred cities will institute medical inspection, there would seem to be a need for well-trained young men along the line of this special work.

"The full-time man selected preferably should have had some experience as an executive in school work. This, with a first-class medical training, including a knowledge of the elements of the specialties, makes a happy combination. He should have a fair outlook upon pedagogical and sociological problems. He should know the 'special case' child. The salary should be somewhere between $2,000 and $3,000 a year. There should be a sufficient number of nurses to assure a daily visit to every school (approximately one nurse to every 1,500 children). The inspector should have an office adjoining that of the superintendent of schools. Provision should be made for a system of adequate records if the work is to be placed from the start upon a scientific basis. A good working and reference library along medical, psychological and sociological lines must be gathered, and a few of the best magazines bearing upon these lines of science must come regularly to the office. These items must be considered when the question of appropriation for the work is up for discussion.

"The appropriation for the first year of such a system in a city of 100,000 should be at least $5,000, and this amount will furnish only the minimum number of nurses. It will be necessary to increase this sum from year to year as the number of nurses for the most efficient conduct of the work is approximated, and also to provide for any additional salaries, equipment, attendance upon conventions, etc., such as may be indicated under a system of health direction as outlined farther on in this paper. The board of education should secure the coöperation of the medical profession in any city in question."

Pellagra Insect-Borne?

The following review (from the *Medical Review of Reviews*, October 1913) of a paper on the mode of transmission of pellagra brings together in a concise form some facts which may be new to our readers and which may give rise to increased investigation and knowledge of one of our little understood diseases:

"Sambon advanced two propositions concerning the cause and nature of pellagra. (1) The hypothesis that it is an infectious disease, and (2) the hypothesis that it is an insect-borne disease. These have been widely accepted, though his third suggestion that the Simulium fly is the specific germ carrier is open to much discussion. This view is opposed by Robert (*American Journal Medical Sciences*, August, 1913), who believes that a mosquito is the carrying agent and offers the following as some of his reasons:

"Those equally confined within doors are equally infected, regardless of sex. The insect probably lives and bites in houses.

"In Italy, Roumania, and America, pellagra predominates in females and in those individuals who remain in and about the house all day. They are more exposed to the disease than those away from home.

"Like malaria and filariasis, pellagra is chiefly rural.

"Pellagra has an unquestioned relation to streams, swamp areas, standing water, and places where the mosquito breeds, as have malaria and yellow fever.

"In areas both malarial and pellagrous, rains and floods that increase malaria, also increase pellagra. With the proper drainage of such areas, both diseases decrease and later disappear.

"Malaria, yellow fever, filariasis, and pellagra all tend to cease spreading, the cases improve, and the disease disappears with the advent of frost, cold, and winter. All these diseases decline during the winter because of the influence of the cold season upon the development of the insect parasite.

"Pellagra, malaria, yellow fever and filariasis are non-contagious and non-inheritable.

"The incubation period in malaria is ten days to three weeks; in yellow fever, thirty-six hours to fourteen days; in pellagra, probably two or three weeks, certainly less than four weeks. This signifies kinship of insect carriers.

"Pellagra is absent from Ireland, where mosquitoes are relatively scarce.

"Malaria, yellow fever, filariasis and dengue are also absent from this land.

"Practically all pellagrous areas are malarial areas.

"Pellagra and malaria have latent periods and periods of activity, due to the change in the seasons, the fixed lifeperiod of the parasite, and its alternating periods of activity and rest; and to changes in climate, altitude and vitality.

"Pellagra, like malaria, yellow fever, filariasis and dengue, has its epidemics, its years of severity and mildness.

"Pellagra occurs in the same belt (north and south) as do all the other mosquito-borne diseases."

Publicity and Public Health.

An editorial in the *Medical Review of Reviews* for October discusses and urges publicity in public health work and points out its relation in this respect to medical science. It is a division of activity, the value of which can hardly be overestimated by health departments, but which is too commonly neglected especially in our smaller cities and towns. Work well done along the line of popular education offers, perhaps the largest returns for a small investment than in any other branch. We quote as follows:

"If the engineers who build bridges and dig canals do not talk much about their methods of work or tell the public about the technical progress of engineering, it does not greatly matter, for what the public wants is simply results—bridges and canals. The physician, in the light of modern preventive medicine, is a health engineer; but he cannot keep within his shell like his brethren in the other profession, because the results which he seeks—freedom of individuals from disease and better general health in the community — cannot be achieved except with the active coöperation of the individual men and women of the communities themselves. The people will not coöperate unless they understand something about the reasons for living according to this or that rule of hygiene, or following one or another regulation. To carry the simile a little farther, every man and woman is in a certain degree the engineer of his own health. The physician is the chief engineer, who is his guide; but the rank and file will not follow this chief like slaves or Japanese soldiers. They must understand what they are told to do and something of the reasons why.

"Modern medicine, progressing as it is more rapidly than almost any other present-day science, needs interpreters—we even dare say popularizers; but popularizers who are interpreters, men of a high order, who will do the kind of work which Huxley did for Darwinism. The physician, the modern engineer of public health, must take the public into his confidence and teach the public, as an educator, without fear of losing professional caste. In proportion as the public is thus taught and thus learns, it will support the medical profession in increasingly aggressive and effective campaigns for public health."

Mine Sanitation

American Medicine (September, 1913) reviews briefly as follows an article in the *Monthly Cyclopedia and Medical Bulletin*:

"N. P. Brooks considers his subject under the following headings:

"1. Ventilation. This subject has been carefully studied by mining engineers but not by sanitarians. It is thought that insufficient attention is given to the size and conditions of the air ways and their possibilities, from the standpoint of reduction of friction. No regard is paid to humidity, and very little to temperature.

"2. Drainage has received very little sanitary attention in general mine engineering.

"3. Disposal of excreta is beginning to arouse the interest of sanitarians but has not yet been applied to mining operations.

"4. Personal hygiene of the men has received very little attention in the United States and none in Mexico.

"5. Lighting has received attention from the study of explosions but none with regard to its effect upon the health of miners.

"Reserve work and first aid have been carefully considered in recent years, but an improvement in the sanitary conditions underground will be likely to develop a better and cleaner set of men and improve those who are already working.

"With this improvement will come less reckless disregard of life, fewer accidents and recognition and avoidance of dangers. The inculcation of bodily cleanliness will have a favorable effect upon the life of miners outside the pit.

"When common sense ideas of health and safety are insisted upon in mining, the same as in mill work, there will be more economical work and better workmanship

"No mine is an agreeable place to those who are unfamiliar with underground work, but any mine can be made as sanitary as the best mill.

"Operative risks will decrease as sanitation improves, but mining will always remain a hazardous occupation."

Malaria Mosquitoes.

The Tropical Diseases Bulletin gives the following review of an article which originally appeared in the *American Journal of Tropical Diseases and Preventive Medicine*, a new magazine published by the American Society of Tropical Medicine:

"The article—contains no new work and is intended to indicate certain lines of research which have been neglected in the past. After criticising the new systematic nomenclature of the old genus Anopheles, the author, confining himself to the American Anopheles, tabulates the valid species with their correct names. Out of the thirty-four mentioned the following eight have been definitely proved to be malaria carriers:

albimanus.	*quadrimaculatus.*
argyritarsis.	*pseudomaculipes.*
crucians.	*pseudopunctipennis.*
intermedium.	*tarsimaculata.*

"Attention is drawn to the fact that, in all probability, the same species of mosquito may behave differently towards the different species of malarial parasites, and work both in New Orleans and Formosa is cited in favor of this view. Thus *A. crucians* acts as the transmitter of æstivo-autumnal fever alone while *A. quadrimaculatus* does not convey this form but is efficient with benign tertian and quartan malaria.

"An interesting subject requiring further investigation is the relation of the habits of different species of Anopheles to malaria transmission. The frequency of blood meals increases the chances for acquiring the parasites. Hence the more voracious the mosquito the more likely is it to be a carrier of infection. Again 'domestic' Anopheles are more likely to be incriminated than those classed as 'wild.' Other phases of the study of Anopheles requiring attention are the relative longevity of different species and their local distribution as governed by topographic conditions. The author advances a plea for the prosecution of these and other investigations required for the proper control of the mosquito."

Hodgins Prize Award.

On the recommendation of the Committee on the Award of the Hodgins Prize of $1,500 for the best treatise "On the Relation of Atmospheric Air to Tuberculosis," which was offered by the Smithsonian Institution in connection with the International Congress on Tuberculosis, held in Washington in 1908, the Institution announces that the prize has been equally divided between Dr. Guy Hinsdale of Hot Springs, Va., for his paper on "Tuberculosis in Relation to Atmospheric Air," and Dr. S. Adolphus Knopf of New York City, for his treatise "On the Relation of Atmospheric Air to Tuberculosis."

The members of the Committee on Award were: Dr. William H. Welch, Johns Hopkins University, Baltimore, Md., chairman: Dr. Hermann M. Biggs, New York City, Prof. M. Davis, Cambridge, Mass., Dr. G. Dock, Washington University Medical School, St. Louis, Mo., Dr. Simon Flexner, Rockefeller Institute for Medical Research, New York City, Dr. John S. Fulton, Baltimore, Md., Brig.-Gen. George M. Sternberg, U. S. A. (Retired), Washington, D. C.

A. P. H. A. NOTES.

President Woodward appointed the following gentlemen as delegates of the American Public Health Association to the National Conservation Congress which was held in Washington, November 18, 19 and 20:

Dr. George M. Kober, Professor of Hygiene, Georgetown University, Washington, D. C.

Mr. Asa E. Phillips, Superintendent of Sewers, Washington, D. C.

Mr. David E. McComb, District Engineer of Bridges, Washington, D. C.

Dr. A. J. McLaughlin, United States Public Health Service, Washington, D. C.

Dr. Karl F. Kellerman, Bureau of Plant Industry, Department of Agriculture, Washington, D. C.

It has been decided that the next meeting of the Association which is to take place in Jacksonville, Fla., be held from November 24 to 28, inclusive.

One of the badges furnished for the American Public Health Association by the Local Committee in connection with the Havana meeting of 1911 has recently been picked up on the street in Washington, D. C. This particular badge is solid gold and was presumably prepared for presentation to one of the chief officers of the association at that time. The badge will be returned to the owner upon request and evidence of ownership. Apply to the Secretary. A. P. H. A.

Morrell Vrooman, for many years head of the Engineering Department of the city of Gloversville, and consulting engineer on questions of sewerage and water supply, will in the future devote his entire time to the engineering firm of Vrooman & Perry.

"In the retirement of Dr. Hermann M. Biggs as chief medical officer of its Department of Health, the city of New York sustains an incalculable loss, for to him, more than to any other individual, are largely due the extraordinary achievements of its public health work. Thanks mainly to Doctor Biggs's initiative, the discoveries in bacteriology in the eighties were used to work a revolution in the methods of public health administration in this city, thus placing this important work on a scientific foundation; and since then, through his tireless efforts, the medical work of the Health Department of the city of New York has constantly been kept abreast of the advances in scientific medicine. In fact, so keen an observer as Koch, on the occasion of his visit here in 1908, remarked that though so many important discoveries in medicine emanated from Germany, their practical application to public health work was more prompt and further advanced in this country. In particular, he mentioned the work done by the New York City Health Department in providing for the microscopical examination of sputum for tubercle bacilli, in examining cultures for diphtheria, in manufacturing and distributing free to the poor, diphtheria and tetanus antitoxin, and in examining blood for the Widal reaction. Since that time the Department of Health has begun the manufacture and distribution of bacterial vaccines, and, still more recently, aids physicians in the diagnosis of venereal infections by making free of charge Wassermann reactions for suspected syphilis and complement deviation tests for gonococcus infection.

"Not only with respect to laboratory work, moreover, has public health administration undergone a revolution. Following the intensive studies made as part of the tuberculosis campaign inaugurated in this city in 1892, attention was directed more and more to the social environment as a factor in public health, and in this feature of the work Doctor Biggs took a very active and leading part."

New York Medical Journal.

The Board of Trustees of the Drexel Institute of Art, Science and Industry of Philadelphia announce the election of Hollis Godfrey, Sc. D., as president of the Institute.

At the invitation of the American Road Builders' Association, President Woodward appointed the following committee to represent the association at the convention of the former organization, held in Philadelphia, December 9 to 12: Mr. Charles F. Mebus, Mr. George S. Webster, and Mr. John A. Vogleson.

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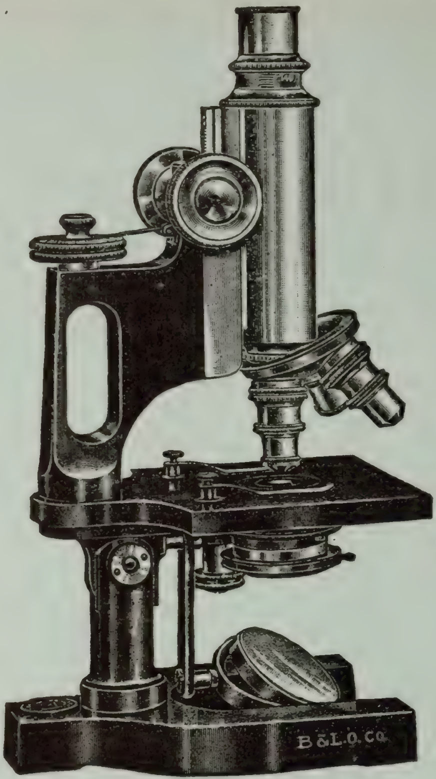

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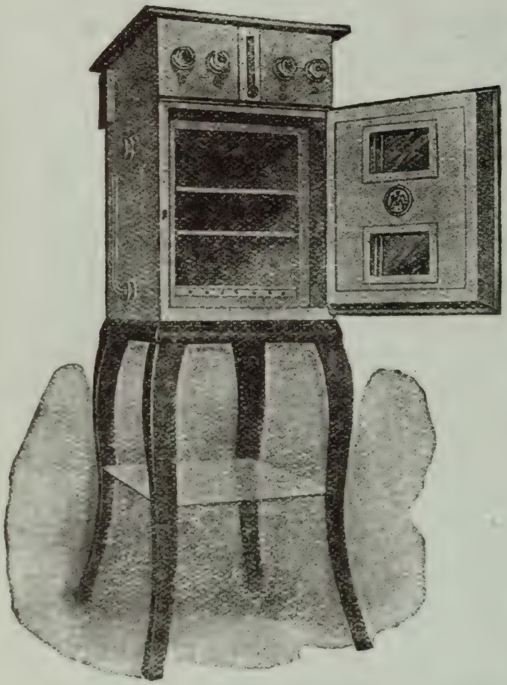

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